

## MIDDLE OF THE E-ROAD

They don't have the resources of larger companies, but mid-size firms are finding their way into e-commerce. Page 46

## STORAGE OVERLOAD

Firms turn to new software and management tools to cope with the swelling tide of stored data. Page 76

## B-TO-B KNOW-HOW

Suspicious of B-to-B auctions? Unsure of how to get the most out of one? Early adopters share their experiences. Page 54

# COMPUTERWORLD

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APRIL 17, 2000 • VOL. 34 • NO. 16 • \$4 COPY

## WEB SITES STRIVE TO PERSONALIZE

*Attracting, not repelling, users a delicate balance*

BY CAROL SLIWA

Privacy watchdogs may be on red alert as Web sites collect bushels of data about their shoppers and visitors, but they won't have to go into attack mode anytime soon against many of the online retailers.

Most retailers are still struggling to analyze the data they have, sometimes from multiple

Web Sites, page 103

## Getting Personal

*How e-commerce sites offer personalization:*

- 64% Tailor e-mail alerts
- 48% Customize content
- 48% Offer account access
- 23% Provide personal productivity tools
- 23% Offer wish lists
- 23% Make product recommendations
- 20% Provide saved links

Source: Forrester Research Inc., Cambridge, Mass.  
Base: Interviews with 44 companies; multiple responses allowed

## NETWORK TO CALM E-TICKET TURBULENCE

*Industry initiative will make airline tickets transferable among participating carriers*

BY MICHAEL MEEHAN

In an effort to give electronic airline tickets the same status as paper tickets, IBM and the International Air Transport Association last week announced a global airline information system that will allow carriers to transfer electronic tickets among their networks.

Currently, when a passenger with an electronic ticket needs to switch carriers, the ticketing airline typically has to issue a paper ticket, and the passenger has to find another airline that will honor it.

Some carriers have bilateral agreements that allow electronic transfers of passengers'

electronic tickets, but such agreements are the exception in the air travel marketplace, according to William Doucette, executive manager of project development at IBM's travel and transportation industry solutions division.

E-Tickets, page 14

## POCKETPC IS NO 'PALM KILLER'

*But Microsoft's offering expected to gain on rival*

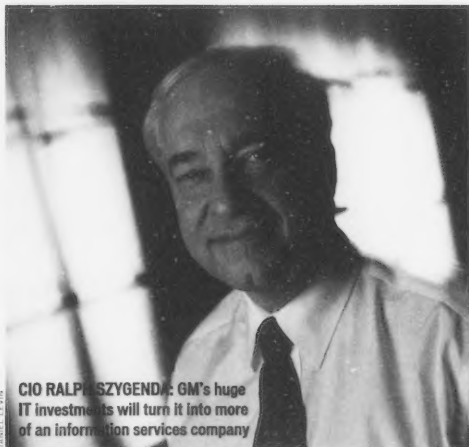
BY BOB BREWIN  
AND DOMINIQUE DECKMYN

The battle for the multibillion-dollar personal digital assistant market kicks into high gear this week when Microsoft Corp., in partnership with three hardware manufacturers, launches its PocketPC.

Users and analysts predict that Palm Inc. in Santa Clara, Calif., will continue to hold its own, even though Microsoft has produced a slick, easy-to-use device unburdened by problems that plagued earlier handhelds based on its Windows CE operating system.

Microsoft has touted the PocketPC, page 12

# GM'S OVERHAUL



CIO RALPH SZTYGEND: GM's huge IT investments will turn it into more of an information services company

THE WORLD'S LARGEST AUTOMAKER IS trying to turn itself into the world's largest e-commerce company. And not just for cars. In interviews with *Computerworld's* Julia King and Lee Cope-land, General Motors executives described their plans to expand TradeXchange into an electronic market for all sorts of businesses. Plus, GM is moving into online mortgages, cellular services and the delivery of information to Web-connected cars, in hopes of jazzing up its staid image and reaping high-margin subscription fees.

Report begins on page 16.

## SUPPLY-CHAIN MAKEOVERS TAX USERS

*Companies need huge budgets, years of effort*

BY CRAIG STEDMAN  
ROSEMONT, ILL.

Installing supply-chain management software can be a big challenge. But for many users, it's turning out to be just the tip of the iceberg of what they

have to do to upgrade their supply-chain operations.

Just as in enterprise resource planning projects, often the deeper task is overhauling the way work gets done throughout a company. That's a big job — a very big job — that can take three years or more and cost hundreds of millions of dollars.

"I don't think we've ever tried to do anything this complex, and I don't think we've stepped up to how complex it is," said Brian Beursmeyer, a materials planning and logistics manager at Ford Motor Co. in Dearborn, Mich.

Ford wants to revamp its manufacturing plants so it can build customized cars for consumers in just two weeks. But that means big changes for

Supply Chain, page 14

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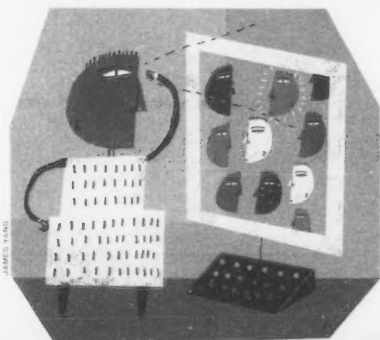
**rules**

of business no longer apply

And neither do the old

**operating  
systems**



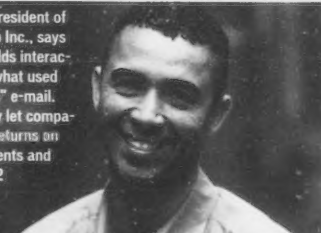


## PASSIVE/ AGGRESSIVE JOB SEEKERS

Recruiters are desperate to find the IT pros who are working, not looking. And there are ways to make sure you get discovered as a non-job-hunter. Page 50

## NEW LIFE FOR OLD-STYLE E-MAIL

David Roberts, president of start-up Firedrop Inc., says the company builds interactive features in what used to be plain "dead" e-mail. The addition may let companies see bigger returns on customer comments and surveys. Page 82



# COMPUTERWORLD THIS WEEK

APRIL 17, 2000

## NEWS

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- 2 JUDGE KEEPS** close tabs on the news as he considers a menu of remedy choices in the Microsoft case.
- 2 MICROSOFT IS** criticized for not adhering to Web standards in its new version of Internet Explorer.
- 4 ANALYSTS WARN** clients to get a trade-in guarantee on Sun's high-end Unix servers before the next version's launch.
- 6 CONGRESS CONSIDERS** a bill that would require spammers to include return addresses or face a fine up to \$500.
- 8 USERS STRUGGLE** with SANs as vendors fail to provide standards.
- 10 INTERNET TOPS** health care executives' priority lists, but they're being cautious.
- 12 SAS BEEFS UP** support for wireless applications so customers can access information warehouses on the road.
- 24 AT&T SIGNS** \$1 billion deal to turn over the IT functions in its customer services division to Computer Sciences Corp.
- 26 IDC PREDICTS** a bright future for the online bill payment market as revenue soars.

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- 40 DOCTORS HATE** the Web, says a Forrester analyst. Health care professionals disagree.
- WORKSTYLES**
- 44 EPICENTRIC OFFERS** plenty of perks to keep its hardworking IT staff happy.
- 46 E-COMMERCE IS** within the grasp of small and midsize companies that can stretch resources.
- 55 CONSULTANTS PITCH** their skills, at little cost, on auction-style talent sites.
- 56 SABBATICALS OFFER** benefits to both companies and employees, but they also come with risks.
- QUICKSTUDY**
- 58 SUSTAINABLE GROWTH** within companies and the U.S. economy is being fueled by technology.

## OPINIONS

- 28 MARYFRAN JOHNSON** calls for a halt to the dot-com bashing that's suddenly all the rage.
- 28 DAN GILLMOR** says Internet taxation is so complex an issue that even an antitax, technology-heavy commission couldn't reach consensus.

## TECHNOLOGY

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- 65 HANDHELD COMPUTERS** are beginning to be used in medical applications to gather patient information and track procedures.
- 66 GENERAL MOTORS** has announced plans to offer a voice-activated cellular Infotainment system in some models of its 2001 Cadillacs.
- SECURITY JOURNAL**
- 70 PAT LEARNS** how tedious a security manager's life can be when he mistakenly messes up the log files he needs to scan for attempted hack attacks.
- HANDS ON**
- 73 THE LATEST** digital cameras offer good value and better pictures. And now they even come with their own operating system and add-on applications.
- QUICKSTUDY**
- 74 FILE TRANSFER** protocol is the standard for moving files across IP-based networks such as the Internet.

In 1990, when I was sending e-mail, I was a geek, and now I'm MTV-cool.

DANIEL SAMBER, SOFTWARE ENGINEER AT THE MOUNT SINAI MEDICAL CENTER IN NEW YORK, WHO IS ONE OF THE REAL-LIFE IT PROFESSIONALS FEATURED IN TECHIES.COM'S NATIONAL AD CAMPAIGN. SEE PAGE 43

- 29 JOHN GANTZ** delivers a wake-up call to corporate IT: Get ready for the WAP phone onslaught.
- 30 DAVID FOOTE** tells IT professionals to sharpen their consulting skills.
- 30 SIMSON L. GARFINKEL** says it's time for U.S. business to craft privacy regulations.
- 44 ED YOURDON** tells companies to consider true dynamics when creating development process models.
- 60 JOE AUER** says he believes a vendor management program can help maintain control over procurement processes.
- 104 FRANK HAYES** says the IT skills shortage has grown beyond the U.S., and he has ideas to stop the hemorrhaging.

## Users, Analysts Weigh In on Vertical ASPs

### Selection criteria depend on industry

BY JULEKHA DASH

When Talbert Medical Group Inc. in Costa Mesa, Calif., selected an application service provider (ASP), it was crucial that the vendor understand the complexities of the health care business.

As a result, Talbert, a group of 106 physicians with \$80 million in annual revenue, chose Newport Beach, Calif.-based TriZetto Group Inc., an ASP that specializes in health care. TriZetto hosts and maintains Talbert's physician-management system, Internet portal and SAP AG applications. TriZetto supports Talbert's network and about 150 desktops.

Some ASPs are touting their vertical market expertise, targeting industries such as health care or retail. But how can users decide whether to stick with these specialists or select an outsourcer with broader experience? Observers say it depends on the industry and on users' requirements.

Al Herak, vice president of practice management at Talbert, said a vendor that specializes in health care would understand how health care claims are processed and be familiar with the various layers of the health care system, which includes third parties, payers and providers.

"The most frustrating thing would be to talk to a programmer [who doesn't] even understand what you're trying to

accomplish," said Herak.

People in the health care industry generally believe that only outsourcers that focus on the industry or have significant health care practices can host and manage clinical applications, said Mark Anderson, an analyst at Stamford, Conn.-based Meta Group Inc. and a former hospital CIO.

"If you're talking about run-

ning a critical-care nursing [system] and you don't know how a laboratory runs—there's probably not a hospital around that will sign on with someone like that," Anderson said.

On the other hand, if a health care provider needs someone to host an enterprise resource planning application or something similar that isn't industry-specific, then it may consider a

broader range of ASPs, he said.

But such vertical-market expertise, which is essential in health care, may not be as necessary in other industries, such as retail, according to analysts.

Although San Francisco-based Coremetrics Inc. targets online retailers with its Web site analysis tool—which it can offer under an ASP model—other industries dipping into e-commerce could just as easily take advantage of the tool, according to Kristen Cloninger, an analyst at Cahners In-Stat

Group in Newton, Mass.

Because the market for ASPs in the retail industry is still relatively young, retailers should consider both generalists and specialists, said Eric Schmitt, an analyst at Boston-based Forrester Research Inc.

Retailers should select an ASP with a business-intelligence focus, he said, and should check vendors' customer references and determine whether their offerings provide the kind of information they're looking for. ■

## Browser Differences Trouble Developers

### Latest versions add to onerous support task

BY DEWAYNE LEHMAN

THE WEB Standards Project last week sharply criticized Microsoft Corp. for not adhering to certain standards in its new version of Internet Explorer. But Web developers said they care less about browser standards than they do about having to support multiple browser versions, following the recent releases of Explorer 5.5 and Netscape Communications Corp.'s Netscape 6.

"The bottom line is that just when you think it should get easier to design Web pages, it gets harder," said Glen Lipka, CEO of New York-based Kokopelli New Media LLC. "I'm annoyed with both [Microsoft and Netscape] because neither can say, 'Why can't we get along?'"

The Web Standards Project said the beta version of the new Internet Explorer fails to meet specifications set by the Cambridge, Mass.-based World Wide Web Consortium for document object model (DOM) and cascading style sheet (CSS) rendering.

It also accused Microsoft of abandoning standards that it had publicly committed to support and of fragmenting the market.

"This puts developers in the position of developing for standards or developing for a prod-

uct," said Jeffrey Zeldman, co-founder of the New York-based advocacy group. "Unless you're a Web shop with blue-chip clients, you won't be able to develop for everyone."

Microsoft responded to the charges in a statement, saying

it "provides the highest standard compliance of any fully released browser" and that it "implemented a significant portion of both DOM Level 1 and CSS support."

But Steve Nevill, CIO at Fort Lauderdale, Fla.-based florist Gerald Stevens Inc., said the real issue is that Web developers are still faced with writing

code for two different browsers. Two weeks ago, Netscape released a preview of its new browser, a completely rewritten version that uses the open-source Gecko browser engine.

"Regardless of who claims they are open or who is closed, there are two standards you have to address," Nevill said, adding that Explorer's market share has made it the more important standard.

With older versions of both products still in use, the latest releases further complicate the browser situation. That's particularly troublesome for Nevill, whose company is moving its applications to a browser base. ■

## Will Stock Decline Affect Microsoft Case?

BY PATRICK THIBODEAU  
WASHINGTON

During the Microsoft Corp. antitrust trial, Judge Thomas Penfield Jackson kept track of current events, sometimes asking questions about the latest headlines. For instance, when America Online Inc. bought Netscape Communications Corp., Jackson immediately asked about it in court.

Now some observers and analysts are asking whether Microsoft's stock decline since the ruling may influence or mitigate the judge's choice of remedy.

The judge is due to get a remedy recommendation from the government by April 28. But ongoing disagreements among 19 states and the U.S. Department of Justice could leave the judge with a menu of remedy choices. Joel Klein, the U.S. assistant attorney general, last week told the U.S. House Judiciary Committee that the views of the states on potential

remedies "are not always identical to ours."

While the government sorts out that problem, the judge may be influenced by Microsoft's stock market decline since the April 3 ruling against the company, said one person close to the case. On March 31, the company's stock was selling at about \$106 per share; it dropped to about \$90 per share the day of the ruling and has been down since then, along with many other tech stocks.

That decline may have its greatest influence on the attorneys general, said an antitrust expert. "If they didn't fully appreciate the potential impact they had on the real world... they should appreciate it after the huge dropoff," said Rich Gray, an attorney at Outside General Counsel Silicon Valley in Menlo Park, Calif.

Yet even if the states and federal officials end up agreeing on a single remedy,

### U.S. v. Microsoft

April 28

Government remedy due

May 10

Microsoft's response

May 17

Government's reply to Microsoft

May 24

Court hearing on remedies

such as a breakup or changes in conduct, it may not matter. The judge has absolute discretion in imposing his own remedies, legal experts said.

In the meantime, members of Congress got some advice from Rep. Henry Hyde (R-Ill.), chairman of the House Judiciary Committee, to let the the judicial system do its job and keep the ruling from turning into a political battle. ■

### ASP Categories

Phil Wainewright, managing editor of U.K.-based ASP News Review, says there are three categories of ASPs that target vertical markets:

- 1 Enterprise application providers that customize software
- 2 Providers that run industry Web portals, with a combination of content, e-commerce and collaborative tools
- 3 Industry vendors that deliver applications on an ASP model





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## AT DEADLINE

### SAS Plans IPO

Data warehouse software vendor SAS Institute Inc. in Cary, N.C., will pursue an initial public offering in the next 12 to 18 months. Jim Goodnight, SAS co-founder and CEO, said last week the company will go public in order to reward current employees and attract new ones with stock options. The 24-year-old firm is the world's largest privately held software firm, with more than \$1 billion in revenue last year and 3,500 employees.

### SEC Postpones Switch

The Securities and Exchange Commission (SEC) has decided to postpone its planned July 3 move from fraction to decimal stock pricing. The agency hasn't set a new date for the changeover. The SEC said it based its decision on the National Association of Securities Dealers Inc.'s (NASD) request to postpone the date because of the Nasdaq Stock Market's current inability to handle the extra traffic generated by the switch. Separately, NASD last week overwhelmingly approved a proposal to spin off Nasdaq.

### Energy Firms Launch Online Exchange

A consortium of six of the top 10 U.S. energy companies are partnering to launch an Internet-based trading exchange for gas, electricity and other energy-related commodities by year's end. The exchange will be open to all wholesale energy companies and compete with other energy-related electronic marketplaces, including those from Enron Corp. and Altra Energy Technologies Inc., both in Houston. The exchange will initially trade natural gas and electricity, then expand to include natural gas liquids, coal, crude oil and other commodities.

### IBM Builds Tiny Drive

IBM has developed a hard drive the size of a postage stamp for use in Microsoft Corp.'s PocketPC hardware. IBM will initially offer a 340MB microminiature hard drive for use in PocketPC hardware. Later this year it will introduce a 1GB hard drive, said industry sources who have tested the PocketPC models.

# Sun Users Advised to Seek Trade-in Options

*Expensive high-end Unix server won't be upgradeable to upcoming UltraSPARC III*

BY JAIKUMAR VIJAYAN

**M**ETA GROUP Inc. last week joined Gartner Group Inc. in advising users to insist on investment protection guarantees when buying Sun Microsystems Inc.'s high-end E10000 Unix server.

That's because each server — which can cost more than \$1 million — won't be upgradeable to Sun's next-generation UltraSPARC III-based servers, which are supposed to ship next year. As a result, compa-

nies that buy new E10000s during the next few months will need to get some kind of a guaranteed trade-in option under which they will be able to swap out their existing systems for the new servers, said Brian Richardson, author of the advisory from Stamford, Conn.-based Meta Group.

#### Protection Planned

Sun hasn't announced a formal upgrade policy, but a spokesman said the company plans to provide full investment protection for customers.

"Just because we haven't announced a formal policy doesn't mean we don't know how to take care of our customers' investments," he said.

Richardson said trade-in options aren't unusual when it comes to very expensive hardware. For instance, when Hewlett-Packard Co. preannounced its V-Series of high-end servers a few years ago, the company offered 100% trade-in protection for customers that purchased its existing servers in the months before the new server shipped, Richardson said.

Stamford, Conn.-based Gartner has been telling Sun users to be prepared since last fall.

"We are advising our clients

not to sign any contracts" until they have a written trade-in offer from Sun, said Tom Henkel, a Gartner analyst.

The highly scalable UltraSPARC III servers, code-named Serengeti, promise a performance boost of 75% to 100% over existing systems, according to Gartner. The systems, which were supposed to start shipping later this year, now won't ship until early next year, Gartner said.

The months leading to the release of the new UltraSPARC III boxes may also be a good time to negotiate steep discounts on the E10000, Henkel said. "If Sun offers you less than 30% off list price, you are paying too much," he added.

Last week, Sun declared profits of more than \$436 million on revenue of just over \$4 billion for the quarter ended March 26. During the same period last year, Sun earned profits of \$292 million on revenue of \$2.96 billion. ■

## SSA Files for Bankruptcy

*Sale of assets could mean better focus*

BY JAIKUMAR VIJAYAN

System Software Associates Inc.'s (SSA) plans to sell most of its technology assets to Gores Technology Group should result in a greater focus on product development and upgrades over the long term, said users and analysts.

But some details related to licensing agreements and existing service and support deals still need to be worked out, they warned.

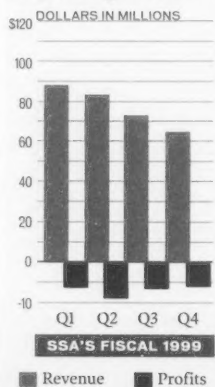
"We are cautiously optimistic that SSA will be able to focus better on its products," said Randy Auman, an SSA user group board member and manager of business analysis at Cone Mills Corp. in Greensboro, N.C. "But we hope the new company will continue to honor all contractual obligations, and that none of it will change."

SSA, a financially troubled Chicago-based vendor of enterprise resource planning (ERP) software for the industrial sector, said it will sell its software and related technol-

gies to a newly created subsidiary of Gores Technology for \$52 million in cash and a 25% stake in the subsidiary. Gores Technology in Los Angeles buys and manages technology companies.

The proposed deal will involve a voluntary Chapter 11 bankruptcy protection filing by SSA. No other details were available, and neither company returned calls.

### Drowning in Red



The sale came as no surprise given the financial problems that have plagued SSA over the past few years, said Gerard Wolf, a vice president at integrator Nexgen Software Technologies Inc. in Naperville, Ill. "The entire user base was very skittish... It was just a question of when and who," he said.

SSA is a second-tier ERP vendor with more than 6,500 installations, running mostly on IBM AS/400 systems. SSA has been struggling in the past few years with quality problems and delays on a client/server rewrite of its flagship Business Planning and Control System (BPCS) software.

The company has been awash in red ink during the past two years. Last year, the company lost more than \$25 million on revenue of \$316 million. In 1998, operational losses exceeded \$23 million on revenue of \$431 million. The losses were in addition to restructuring charges in excess of \$129 million, which were related to layoffs and other cost-cutting moves in 1998.

"The cutbacks and the reorganizations they have gone through over the last couple of years strained their ability" to continue enhancing and supporting their software, Auman said.

"We were in the process of

implementing their software but never followed through on it" because of concerns that SSA's financial problems would hurt its ability to support BPCS, said Mike Durant, director of information services at Fort Wayne Plastics Inc. in Fort Wayne, Ind.

But that should change with last week's sale, said Gary Hoskins, an information technology director at Collins and Aikman Corp., a Charlotte, N.C., automotive supplier. "Our understanding is that the SSA unit will remain intact under Gores Technology... But we need to know who we are going to be dealing with from a contractual and support point of view." ■

### Corrections

In the story "Computer Junk," [News, April 10], the price for which Paul Kirk, head of information technology at United Companies Financial Corp., sold used PCs to employees was misstated. The price was \$100 each.

Norwegian Cruise Lines Ltd. has completely outfitted its nine-ship fleet with Internet access [News, March 27].



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# IBM Wants DB2 to Be The Internet Database

With Version 7, sets sights on Oracle users

BY CHRISTINE McGEHEE

**I**BM LAST WEEK announced Version 7 of its DB2 Universal Database, which it claims was "designed from the ground up for dot-coms."

The new version is equipped with multiple features targeted at the e-commerce market, as well as utilities to ease migration from competitors' products to DB2.

IBM clearly hopes to steal customers from Oracle Corp.'s

Internet-oriented database product. "Companies are anxious to have an alternative to Oracle — to have a better relationship with their vendors and to pay one-third of the price," said Janet Perna, general manager at IBM Data Management Solutions.

Features of Version 7 include the following:

- New in-memory database technology that performs Internet searches 10 times faster than regular search engines.

- Integrated XML, Java and procedural languages.

- Relational Connect, a feature that provides native query access to Oracle databases.

- OLAP Server, previously an optional add-on package, which will ship with every copy of DB2 Version 7.

## E-Commerce Appeal

Norma Schroder, an analyst at Dataquest in San Jose, said IBM's investment in migration aids — product features as well as training support — are good moves for a company wanting to appeal to e-commerce ven-

dors. "Dot-coms are definitely looking at IBM's OLAP [online analytical processing] implementation," she added.

Guy Zales, founder of Business Interactive Corp. in Ottawa, said his firm's application service provider, Warrantynet.com, is porting from Oracle to IBM's DB2 Version 7 because customers are asking for it. Warrantynet.com runs heavy data exchanges between customers, making integrated support for OLAP, XML and Java essential, he said.

Zales said his company has had "good experience" with Oracle as well, but he welcomes the competition in the market.

"It's doubly advantageous for us. It is allowing us to expand," he said, because some subscribers have been asking

## AT A GLANCE

### Dot-com Database

DB2 Version 7 targets e-commerce with:

- Fast Web-based text searches
- Native XML and Java support
- Internal stored procedures
- Native query access to Oracle databases
- OLAP Server bundled with DB2

for IBM database applications.

The beta release of Version 7 can be downloaded from IBM's Web site. The final product is expected to be available in June on Unix, Linux, Windows NT, Windows 2000 and OS/2. Pricing will be announced at that time. ▀

# Effectiveness of Antispam Bill Questioned

Observers fear it won't curb junk e-mail

BY PATRICK THIBODEAU

Congress is expected to pass antispam legislation by July, but the bill doesn't ban unsolicited e-mail, and it's uncertain whether it will reduce the volume of spam hitting corporate networks.

The legislation, which recently won a key subcommittee endorsement, is intended to make it easier to win damages from people who send unsolicited commercial e-mail. The bill also would make it illegal to forge addresses.

The Unsolicited Electronic Mail Act is gaining congressional support because it relies more on private litigation than on government oversight to curb spam. Although anyone can sue a spammer, it can be difficult to show damages. The bill would allow plaintiffs to seek as much as \$500 for each offending e-mail received.

It has also quieted a fractious division in Congress over how to approach the problem by combining three separate antispam bills sponsored by U.S. Reps. Gary Miller (R-Calif.), Heather Wilson (R-N.M.) and Gene Green (D-Texas).

But the bill won't prevent junk e-mail. It would force users to opt out "of hundreds or thousands of mailing lists

that they didn't ask to get put on in the first place, and [that they] almost certainly don't want to be on," said David H. Kramer, an intellectual property attorney at Wilson Sonsini Goodrich & Rosati in Palo Alto, Calif. "It's better than the alternative, which is nothing."

The bill would require accurate return addresses on spam so users can seek removal.

Proponents, including some antispam groups, say the bill's

strength rests in its ability to allow Internet service providers to seek legal enforcement of e-mail policies. The bill "negates a lot of the cost and difficulty" in bringing a lawsuit, said John Mozena, a spokesman at the Coalition Against Unsolicited Commercial Email in Weed, Calif.

Antispam groups and some users, such as Tom McCafferty, network manager at the Reynolds Metals Co. facility in Muscle Shoals, Ala., said the threat of private litigation

could deter spam.

"But I question whether the government really needs to be in that business so much. It's an intrusion on freedom of speech," said McCafferty, who added that Congress should exercise caution. "A lot of meaner things are going on; this is just a nuisance," he said.

The Internet Alliance, a Washington trade group, says it has concerns about the labeling. If the bill is approved, the U.S. Federal Trade Commission will require unsolicited commercial e-mail to have a subject-line label such as "ADV," for advertisement. "We support legislation that will

make a difference — ADV will not get the bad actors," said Emily T. Hackett, state policy director at the alliance.

But legitimate businesses sending e-mail as a result of users' registration won't have to label, say the bill's supporters.

Another concern is that spammers could shift their work offshore to escape U.S. laws. "The reach of U.S. laws simply won't do any good," said Paul Sunil, CEO and co-founder of Brightmail Inc. in San Francisco. Brightmail supplies antispam technology that relies on staff to continuously examine spam and set filters to block it. ▀

## Spam Attack

Antispam bills have been passed in 16 states so far, and Congress may approve legislation by July.

- The bill would quantify spam "damages," allowing plaintiffs to seek \$500 per incident or up to \$25,000 per day from someone sending unsolicited commercial e-mail

- Using false headers would be illegal

- Spammers would have to abide by an Internet service provider's spam policies or risk legal action

- Spam would have to be labeled, possibly with "ADV," for advertisement

# Embedded Chips to Make Packaging 'Smart'

BY KATHLEEN MELYMUKA

International Paper Co. and Motorola Inc. said last week that they have agreed to manufacture "smart packages" designed to enable manufacturers, distributors and retailers to improve inventory control throughout the supply chain.

Tiny silicon chips embedded in the packaging will contain information that can be read and modified through a wireless interface. The goal is to enhance inventory control and security through improved identification, routing and tracking of products. A unique identifier placed in high-value consumer goods

such as perfumes may also protect against theft and counterfeiting.

The smart packages are based on Schaumburg, Ill.-based Motorola's new BiStatix radio frequency identification technology, which combines silicon with printed ink. While current bar-code technology enables packages to be tracked through scanners, smart packages will emit radio signals enabling manufacturers and retailers to track them continuously as they move from factory floors to retail stores and checkout counters.

"The breakthrough here is the marriage of electronics and

paper, which will produce huge customer service enhancements while virtually eliminating much of the supply-chain inefficiencies now burdening manufacturers and retailers," said Bill Slowikowski, senior vice president of consumer packaging at International Paper in Purchase, N.Y. He added that in the U.S. alone, there is an estimated \$250 billion in yearly waste attributable to inefficiencies in the distribution of products from manufacturers to consumers. Retail counterfeiting was responsible for approximately \$70 billion in U.S. industry losses last year. ▀



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## BRIEFS

## High-Tech vs. Visa Bill

Some high-tech lobbying groups are opposing a bill introduced last week by U.S. Rep. Lamar Smith (R-Texas) that would lift the H-1B visa cap. Harris Miller, president of the Information Technology Association of America (ITAA), said the bill is weighed down by "a whole lot of little anchors" that could thwart efforts to increase the 115,000-visa cap, including a provision that would tie additional visas to completion of delayed U.S. Department of Labor immigration regulations. The ITAA is supporting legislation that would increase the cap during the next several years to 200,000.

## Net Tax-Break Battle

The Advisory Commission on Electronic Commerce report, which backs an extension of the Internet Tax Freedom Act, is being opposed by 42 state governors. The governors, in a letter to House and Senate leaders, said the report provided special interest tax breaks and intruded on state sovereignty. The act, which bans new taxes aimed at e-commerce, will expire next year.

## 10 Million Domains

Network Solutions Inc. last week said it reached the 10 million mark in domain name registrations. The milestone now gives Network Solutions the second spot behind America Online Inc. for paid subscribers, with an estimated 160 million domain names registered. VeriSign Inc. last month agreed to buy the Herndon, Va.-based registrar.

## Amazon.com on Top

PC Data Online in Reston, Va., has reported that Amazon.com Inc. in Seattle is once again the top online retailer, logging 14.8 million users and 1.1 million buyers in March. The giant Web merchant had slipped to second place in February behind CDNow Inc.

According to PC Data Online, CDNow finished second in March with 6.6 million users and 628,000 buyers, followed by Ticketmaster.com (4.2 million users and 519,000 buyers), Barnesandnoble.com Inc. (5.4 million users and 362,000 buyers) and Buy.com Inc. (2.3 million users and 309,000 buyers).

# SAN Popularity Rising, But Users' Doubts Linger

*Survey: Lack of standards, cost and unproven technology remain roadblocks*

BY KATHLEEN OHLSON

VENDORS ARE shouting from the rooftops that this is the year of the SAN. But users are barely whispering their support for storage-area networks (SAN).

Despite having SAN components, users are struggling with issues such as cost, interoperability and unproven technology.

These concerns were apparent in last month's *Computerworld* survey, when 160 information technology sites were asked about their current SAN use or implementation plans.

Of the U.S. corporations and federal IT sites surveyed, 66 have no SAN implementation plans, 80 are in the initial deployment stages and 14 have been using SANs for more than three months (see chart).

Richard Ptak, an analyst at Hurwitz Group Inc. in Fram-

ingham, Mass., said vendors are actively educating users about SANs. Customers are afraid of the unknown and the risks, but education "will get companies that are sitting back to move quickly," Ptak said.

## Sans SANs?

Respondents' use of storage area networks (SAN)

PERCENT OF SURVEY BASE	
Using SAN currently	10%
Will implement SAN within three months	3%
Will implement SAN in six months	7%
Will implement SAN within one year	11%
Planning to implement a SAN in the future but have no firm date	28%
Have no plans to use a SAN at this time	41%

BASE: 160 IT SITES WITH 500 OR MORE EMPLOYEES

SOURCE: COMPUTERWORLD SURVEY, FEBRUARY-MARCH 2000

And vendors still lack a standard text to teach timid users. The current standards battle is between the Fibre Alliance, led by EMC Corp. in Hopkinton, Mass., and the Storage Networking Industry Association. Neither side is very close to defining any kind of common ground.

As a result of this lack of agreement on standards, customers are forced to go with vendor-specific systems, said Adam Couture, an analyst at Dataquest in Lowell, Mass.

Users surveyed expressed concern over SANs.

Akhtar Rahmetulla, strategic architect at Levi Strauss & Co. in San Francisco, recently started researching SANs. He said he's looking at EMC, Hitachi Data Systems in San Jose, Compaq Computer Corp. in Houston and Xitech Corp. in Eden Prairie, Minn.

A 3-terabyte box with a Fibre Channel switch from EMC is priced at \$400,000, while a system with the same configuration from Compaq is \$98,000, said Rahmetulla.

For Chris Wallis, vice presi-

dent of MIS at Old First Bank in Baltimore, cost isn't the primary concern. Reliability is.

"The last thing we want is to lose customer data. So that's why we're going slowly," said Wallis.

Wallis' concern is echoed by David Leuck, technical services manager for Culver City, Calif. Leuck has used SAN components for one year, including Islandia, N.Y.-based Computer Associates International Inc.'s ArcserveIT. While it's flexible, ArcserveIT lacks stability and reliability in backup and disaster recovery, said Leuck.

## Questioning the Future

Such gripes led Chris Selland, an analyst at The Yankee Group in Boston, to question the future of SANs.

"The market is immature, and it's still early. But will it ever get big?" Selland said. SANs appeal to IT workers, but they have to lock into one vendor. And "it's near the point where customers will throw their hands up and look at different models," he said. ■

## CA Partners for Exchange

*Analysts rave about new B-to-B portal*

BY SAMI LAIS  
NEW ORLEANS

A major business-to-business exchange took wing here last week at Computer Associates International Inc.'s annual user conference, CA World.

Tokyo-based Keiretsu Nishio Iwai and Islandia, N.Y.-based CA together announced Cynomix Corp., a joint venture to build an online, cross-industry business-to-business trading exchange called ETrade Lifeline.

The new marketplace will let users handle every phase of a sale, from locating a seller or buyer to insuring, transport-

ing, storing, exporting and importing goods.

"It's going to make existing portals look like nursery school projects," said Michael Dorch, an analyst at Robert Frances Group Inc. in Westport, Conn. "By fully integrating and automating all the logistical and financial elements, they're creating a true enterprise-class business-to-business exchange," he said.

## Jasmine II Platform Released

The weeklong event saw the release of CA's electronic-business platform, Jasmine II. CA called Jasmine II an e-commerce platform, an integration platform and an infrastructure.

The development tool exists between sources of data and system management software.

By turning data from applications or databases into objects and using XML standards, Jasmine II allows any data to be used by any application.

The conversion process isn't perfect and it may result in a loss of data, but "it's a good start," said Patrick Dryden, an analyst at Giga Information Group Inc. in Dallas. With Jasmine II, CA "is trying to make systems easier to manage, and that's a good thing," he said.

Jasmine II is also an integral part of Unicenter TND (see chart at right).

BizWorks enterprise applications from CA's InterBiz division also debuted at CA World. Built on Jasmine II, BizWorks allows delivery of information to PCs and handheld devices such as pagers and cell phones.

CA also announced that it had reorganized and combined its field operations, including

sales and services, because too many people from different divisions were calling on clients.

The services divisions of Sterling Software, acquired by CA in March, will be integrated into the new structure next month. ■

## AT A GLANCE

## Tools for E-Commerce

Unicenter TND beta highlights:

**Time:** "Snapshots" let managers roll back systems view, change by change, "like a VCR," said Carl Hartman, CA senior vice president. Neugents predict probable future status

**Performance:** Neugents provide automated workload balancing for network systems, applications availability and security monitoring

**Access:** Improved 2-D and 3-D user interface adds contextual business data to systems view, voice recognition and voice activated commands option throughout

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## Users Take Cautious Approach to 'E-Health'

BY JULEKHA DASH  
DALLAS

Internet-related projects will be a top priority for health care

information technology executives this year. But some attendees of the 11th annual Health-care Information and Manage-

ment Systems Society (HIMSS) conference last week said they are taking a cautious approach toward "e-health," as many

products have yet to mature.

Nearly two-thirds of health care providers said they will likely deploy Internet technologies this year, according to a survey of more than 800 health care IT executives.

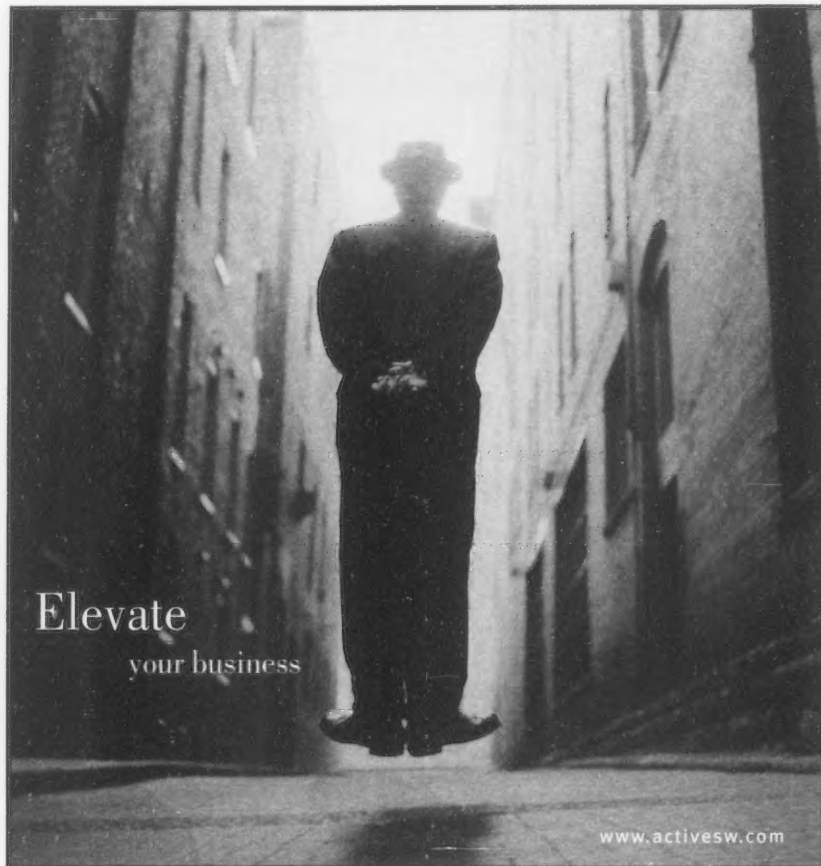
Chicago-based HIMSS released the survey results at the conference, where an unexpectedly high turnout topped 20,000 people. IBM sponsored the survey.

But in spite of the wide range of technology issues at hand for health care IT executives, most vendors and users were talking about electronic health, which, according to users, is filled with hype.

"Walking the [exhibit] floor, I'm trying to separate the vapor from the reality," said Scott Cebula, executive director of information services at Memorial Care, a group of five hospitals in Long Beach, Calif. "A lot of products aren't there in what is considered e-health. They're not mature solutions [that are] widely implemented."

One reason users should approach electronic-health initiatives with caution is that some vendors in this market won't survive in the next year, according to Michael Davis, a research director at Gartner Group Inc. in Stamford, Conn. Consequently, Davis advises his clients not to sign a contract with an electronic-health vendor that lasts more than two years.

Although the health care industry has seen some major online supply-chain initiatives in recent weeks (News, April 3), many providers will probably take a wait-and-see approach, said Gregory Walton, CIO at Carilion Health System in Roanoke, Va. With limited resources, Walton said, his dollars are better spent on a new CAT scanner while he waits "for vendors to get their act together." ▀



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### Hot in Health

Top initiatives among IT executives in health care will include the following:

**62%** will likely deploy Internet technologies

**56%** will upgrade systems for health regulations

**41%** will upgrade network infrastructure

SOURCE: THE 11TH ANNUAL HIMSS LEADERSHIP SURVEY, SPONSORED BY IBM

### MORE THIS ISSUE

For a report on why doctors are wary of the Internet, see page 40. For a look at how handhelds are meeting health care needs, see page 65.



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# Palm's Mace Is Officially 'Paranoid' About PocketPC

*As chief competitive officer, he has to worry about 'smart' cell phones, too*

BY BOB BREWIN

**M**ICHAEL MACE, chief competitive officer at Palm Inc., plans to have advanced paranoia this week as Microsoft Corp. and its hardware partners launch the competing PocketPC Wednesday.

Mace, who earned a political science degree with a specialty in nuclear deterrence, said his paranoia is not some "duck and cover" '50s flashback, but the primary component of his role as chief competitive officer. He

claims that the title is appropriate in the fiercely competitive information technology industries. Despite being the leader in a market expected to grow from \$2.8 billion this year, up \$800 million from last year, Mace said, "My job is to make Palm as internally paranoid as possible. We can't afford to become complacent, and I want to keep on eating."

## Keeping an Eye Open

Microsoft stokes his paranoia, Mace said, because even though "the Palm OS is based

on Windows and we have a good relationship with Microsoft, you never turn your back on them."

Mace said he intends to watch Microsoft and the PocketPC closely "because they have a long history of making gradual improvements to their products, and we can learn from what they are doing — and when appropriate, add innovations to our products," he said.

When not hyperventilating over potential inroads by Microsoft, Mace said, he spends time worrying about increasingly smarter cellular telephones, calling mobile phones his "No. 2 concern after Microsoft." Palm is aware that some analysts and competitors

believe "that once intelligence is built into cell phones, Palm will be destroyed," he said.

Santa Clara, Calif.-based Palm doesn't subscribe to that theory, because even the smartest cellular phone is still a dumb terminal, he added.

But Palm does see a future in partnership with the cellular phone industry, signing agreements with Finland-based Nokia Corp. to develop products "that will put a Palm and a cell phone in one device," which he calls the "ideal" com-



**PALM'S MIKE MACE:** The company can't afford to grow complacent

bination of two devices that executives now wear strapped to their belts.

Gartner Group Inc. in Stamford, Conn., said Palm and Mace need to be even more paranoid if the company wants to maintain its edge. Gartner analyst Ken Dulaney said Palm "has become complacent," and he whipped out a Palm personal digital assistant (PDA) and a PocketPC to illustrate his point. Pointing to the sleek, curved design of the PocketPC vs. the squared-off look of the newest color Palm, Dulaney said Palm has already lost the "fashion" race — and emphasized that form is as important as function in the PDA market, even for corporate users. ▀

Continued from page 1

## PocketPC

PocketPC's Secure Sockets Layer security capabilities as appealing to information technology users. But the effort may be futile.

Joe Chouinard, vice president of e-commerce at Visa International Inc. in Foster City,

Calif., said the global credit-card issuer has no immediate plans for either Palm or PocketPC devices due to the small number of users compared with people equipped with smart mobile phones. Looking at projections of 1.1 billion mobile phone users by 2003 vs. 32.5 million personal digital assistant users, Chouinard said, "most of our efforts will be concentrated on mobile phones."

Jim Thannum, corporate director of technology management at FDX Corp. in Memphis, said "it's too premature" for him to make an assessment of the corporate utility of the PocketPC. But, he added, "we're watching it with a great deal of interest."

Wisconsin Public Service Corp. (WPS) recently standardized on the Palm III and Palm V rather than Windows CE devices. "Obviously, this is a new technology for us, and we wanted to start off simple," explained Steve Mitchell, a senior systems analyst at WPS. The Green Bay, Wis.-based company also chose Palm because of its 80% market share, which Mitchell said will attract more software developers.

Analysts who have tested PocketPC hardware — available at Wednesday's launch

from Casio Inc. in Dover, N.J., Compaq Computer Corp. and Hewlett-Packard Co. — were impressed. Ken Dulaney, an analyst at Gartner Group Inc. in Stamford, Conn., called the new Windows CE operating system in the PocketPC "adequate" compared with earlier versions and had high praise for what he called its "sleek design."

Dulaney said he has no doubt that the PocketPC will become a "corporate tool," but he quickly added, "It's no Palm killer."

Jack Gold, an analyst at Meta Group Inc. in Stamford, agreed that the PocketPC won't reverse Palm's dominance. But "it will stop the hemorrhaging" of Windows CE, he said. ▀

## SAS Adds Support for Wireless Devices

BY LEE COPELAND  
INDIANAPOLIS

Data warehouse vendor SAS Institute Inc. last week added support for wireless-access devices, a capability that users said could be useful to mobile workers if security concerns are overcome.

The Cary, N.C.-based software company beefed up its Intelligent Warehouse product to include support for the Wireless Application Protocol (WAP) and to enhance existing HTML support, officials announced at the vendor's annual user conference here.

The new protocol support will let users retrieve information from the data warehouse using wireless handheld devices. SAS Institute introduced wireless support in Europe last

year and is now making it available in North America.

Jeff LeSuer, senior director of marketing planning and analysis at BMG Direct, a music subscription service in New York, said wireless support would give mobile workers better access to up-to-date information from the road.

"One of the benefits of a data warehousing service is getting the marketing and business information out to different parts of the organization," he said. "Providing access through different devices is just going to make [it] that much easier."

Norm Hult, director of data warehousing at Knoxville, Tenn.-based BankFirst Corp., expressed concern about sending sensitive financial data to workers in the field using wire-

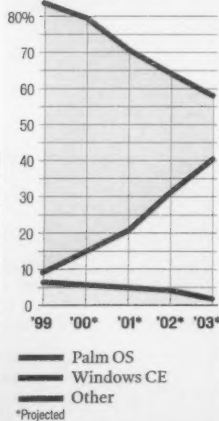
less devices. "We have a hard time seeing the practical use of wireless access," Hult said. "I'm not wild about transmitting information over the wires," let alone over wireless.

Mike Schiff, an analyst at Current Analysis Inc. in Sterling, Va., said security measures such as encryption have improved the security of wireless transmissions.

"It used to be that cellular conversations could be picked up easily over analog lines. But digital signals can be encrypted, so that if a message is intercepted, it won't make sense. With digital, you're just sending zeros and ones," Schiff said.

He added that as the WAP standard evolves, vendors will be able to add security features to address user concerns. ▀

## Handheld OS Market Share



SOURCE: INTERNATIONAL DATA CORP./FRAMINGHAM, MASS.

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## BRIEFS

### Generation D Is Born

MCI WorldCom Inc. in Clinton, Miss., announced last week that it's pooling all of its Web activities under the name Generation D (for digital). The company said it would add another 12 data centers in the coming months and promote Web site and application-hosting services for large and small businesses.

## Paper-Digital Merger

Optika Inc. in Colorado Springs announced browser-based software designed to let trading partners use a single Internet-based infrastructure to resolve disputes arising from either paper-based or electronic transactions. The Acorde software offers access to electronic orders plus data from paper documents scanned into the Acorde system.

## Cracker Cracks

A computer cracker, who broke into Web sites run by the White House and the U.S. Army, pleaded guilty to federal computer crimes. According to prosecutors, Patrick W. Gregory of Houston, who went by "Most-HatedD" and helped form the Global Hell cracking group, pleaded guilty to a single count of conspiracy to commit telecommunications wire fraud and computer cracking.

## Seagate Posts Profit

In one of its last earnings statements before going private, Seagate Technology Inc. reported \$136 million in profits, including one-time charges, for the third quarter, ended March 31. The Scotts Valley, Calif.-based hard-drive maker earned \$82 million a year earlier. Sales fell to \$1.57 billion from \$1.81 billion.

## Exabyte's Loss String Persists in Q1

Exabyte Corp. lost \$13.6 million in the first quarter, ended April 1. The Boulder, Colo.-based tape-storage device provider reported a \$3.5 million loss a year earlier. First-quarter sales totaled \$49.6 million, compared with \$62.7 million a year earlier. Exabyte warned investors about the shortfall, attributing a sales slowdown to year 2000 issues.

Continued from page 1

## E-Tickets

Rather than having carriers build multiple connections among their proprietary systems, IBM worked with the IATA to create the single-connection Global ET program. Airlines can join the network and transfer passengers in real time, eliminating one of the largest barriers to electronic-ticket acceptance, according to Andreea Dutescu, manager of the IATA's network business development wing.

"Airlines have reported savings of \$1 to \$8 for [each] e-ticket issued, but the inability to [transfer] prevents their global acceptance," said Dutescu. "The industry has to have a solution if it wants to make e-tickets the rule."

Michelle Weeks, general

## AT A GLANCE

### E-Tickets Made Easy

Global ET will:

- Allow airlines to connect to a single point and perform real-time transactions
- Give individual airlines discretion over how much information they log into the Global ET network and who has access to it
- Enable customers with e-tickets to change airlines by stopping at a single counter rather than shuttling between carriers
- Run on a high-volume IBM transaction processing platform that can handle 7,700 transactions per second

manager for electronic ticketing at Delta Air Lines Inc. in Atlanta, said her company is already attempting to work out electronic-ticketing agreements with the other carriers in an online alliance that was recently formed with United Air Lines Inc., American Airlines

Inc., Continental Airlines Inc. and Northwest Airlines Inc.

The Global ET program "would have to have at least one other alliance partner to make it worth our while," said Weeks.

Brendan Byrne, general manager of electronic business at Aer Lingus Group PLC in Dublin, said the entire airline industry needs to adopt some sort of electronic-ticketing standard.

## Non-Compete

"This shouldn't be a competitive advantage," he said. "This should be a service that's out there." He noted that if the members of a particular alliance form their own standard, the problem won't be solved.

"[Airlines are] not quite used to the idea of working together," said Jeffrey Osborn, director of sales and marketing for transportation industry solutions at Science Applications

International Corp. in San Diego. "This runs counter to the way they've always done business."

But doing business the old way had its drawbacks.

For example, when US Airways Inc. was recently threatened with a flight attendants' strike, Delta agreed to honor USAirways electronic tickets and brought in 30 programmers to create a link between the two systems, said Weeks.

Doucette said that's the kind of inefficiency that Global ET was designed to avoid.

"There's an enormous need for what we're doing," he said. "Maintenance is one of the biggest IT costs on the airline side. The cost of establishing this link with us would be a system integration effort one time and you're done."

Final coding and unit testing of Global ET is expected to be completed this summer, Doucette said. ■

Continued from page 1

## Supply Chain

Ford's employees, dealers and suppliers alike. "This is going to ripple through our whole company and the supply chain," Beursmeyer said.

Beursmeyer was one of a half-dozen users who spoke about the complexity of retooling supply chains at a conference here last week that was sponsored by the Supply Chain Council, a Pittsburgh-based group of users, technology vendors and consulting firms.

For the users at the conference, installing new systems is just a piece of what they're doing, albeit an important one.

For example, London-based BP Amoco PLC's petrochemicals division installed SAP AG's R/3 ERP applications and is putting in supply-chain planning software.

But the \$9.4 billion division is also re-engineering numerous business processes in areas such as order processing and customer service at all 20 of its business units, said Ken Evans, who was part of a team that evaluated the division's supply-chain performance before the work began.

Combined, the technology and business changes are expected to take three to five

years and cost "hundreds of millions of dollars," Evans added.

Six months ago, General Motors Corp. in Detroit launched a supply-chain project with similar goals as those for the project under way at Ford. The work is expected to take three years to complete and cost an amount similar to what BP Amoco Chemicals has budgeted, said Curtis Songer, general director of GM's supply-chain management team.

"It's a huge endeavor," Songer said. "It really requires the re-engineering of almost all of our business processes relative to supply-chain management, plus a big investment in new technologies."

It's not just massive companies like Ford and GM that have to make those kinds of internal changes to get their supply-chain houses in order.

Gold'n Plump Poultry Inc., a \$200 million chicken processor in St. Cloud, Minn., installed new manufacturing and production planning software last fall as part of an effort to improve things such as its ability to forecast demand and fill orders correctly.

But Tim Wensman, an executive vice president at the company, said Gold'n Plump also made a series of organizational changes. For example, the sales department was given

new responsibility for demand planning, and the company's plants began processing to a demand-based schedule instead of making whatever they could each day.

And only the planning side of the business has been addressed so far. Now, Wensman said, Gold'n Plump wants to redesign its product-distribution arm. Finishing the entire project could take another two to four years, he added.

For many companies, supply-chain projects are "an

awesome task" to pull off, said Sandy Boyson, co-director of a supply-chain management institute at the University of Maryland in College Park, Md.

"The management challenges are enormous," Boyson said. And installing new applications is rarely the answer by itself, he added. "There's a lot more pain involved than that," he said.

But users said they expect big paybacks for all their troubles. Dow Corning Corp. is targeting annual savings of \$150 million starting next year, said Timothy Troup, a supply-chain specialist at the Midland, Mich., chemical maker.

BP Amoco Chemicals hopes to reduce annual costs by up to \$460 million, said Evans, who's now managing the company's SAP system.

And senior executives there felt they didn't have any choice other than to bite the bullet, Evans said. Benchmarks showed that the petrochemicals unit wasn't keeping up with industry averages on metrics such as order cycle times. "We weren't going to survive if we stayed that way," he said. ■

I don't think we've ever tried to do anything this complex, and I don't think we've stepped up to how complex it is.

BRIAN BEURSMEYER,  
MATERIALS PLANNING  
AND LOGISTICS MANAGER,  
FORD MOTOR CO.

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# GM Retools for E-Commerce That Goes Well Beyond Cars

*Automaker to offer Internet services, mortgages and online procurement*

BY JULIA KING  
AND LEE COPELAND  
DETROIT

**G**ENERAL MOTORS Corp. wants to be more than your car company. Much more.

Think real-time stock quotes, talking e-mail messages and video games — all delivered at the dashboard.

Think satellite-based radio services, online car financing and home mortgages.

Think of a multibillion-dollar online trading exchange that reaches beyond carmakers and parts suppliers to hundreds of thousands of other businesses around the globe.

These are just a few of the strategic businesses in which GM is making huge information technology investments. The goal is nothing short of transforming the auto giant into a leading provider of Internet-based information services whose recurring revenue potential rivals the \$176.6 billion GM piled up last year making and selling 8.5 million cars and trucks.

"Clearly, services will become a larger part of our revenues, and the services dictate how you build and support vehicles," said Ralph Szygenda, the auto giant's CIO and architect of its Internet strategy.

"If we don't take those [services] revenues, someone else will," he added.

Virtually all of GM's electronic business initiatives center on leveraging two extremely potent forces: leading-edge Internet technologies and the automaker's gargantuan presence in both consumer and supplier markets.

TradeXchange, the company's joint online marketplace initiative with Ford Motor Co. and DaimlerChrysler AG, is a prime example.

So far, GM has invested \$600 million in the exchange, through which it plans to pur-

chase all of the materials it uses in manufacturing — about \$87 billion annually — from 30,000 suppliers.

But that's just the beginning. GM is also opening up the exchange to parts buyers at companies in other industries, including Sony Corp. and IBM. Eventually, it will also include GM's 7,000 North American dealerships, which, among other things, will be able to buy their cleaning and office supplies plus host online auctions of used cars through the exchange.

GM is also looking to integrate goods and services of other online exchanges in related industries, such as those of E-Steel Corp. and MetalSite

Through OnStar, GM has the potential to be the country's largest reseller of cellular services.

CHET HUBER,  
GENERAL MANAGER, ONSTAR



LP in the metals industry, plus offer outsourced software services for logistics, transportation planning and supply-chain management, all of which would generate additional and recurring revenue.

A total of 150 people from the automakers and their technology partners, Oracle Corp. and Commerce One Inc., are working full time on TradeXchange, which the partners plan to spin off as a separate company by year's end.

"The exchange will be much more than a purchasing exchange," said Harold Kutner, GM's group vice president of worldwide purchasing.

It will also serve as a critical information portal where GM's suppliers retrieve real-time plant production schedules, inventory data plus never-before-available data about the exact makes and models of cars that

consumers are eyeing on dozens of GM and non-GM Web sites.

This is a key element in transitioning GM's suppliers to a "sense and respond" mode of inventory replenishment, which will bring GM a big step closer to its ultimate goal of electronically executing the entire order-to-delivery process by 2003. If GM succeeds, Goldman, Sachs & Co. predicts, it will shave \$3,700 from the cost of every car it produces.

Other analysts say that figure is too high.

"A Web-based infrastructure that integrates activities is important [because] now, manufacturing makes, engineering designs and purchasing works with suppliers," said Hiro Mori, an analyst at Automotive Consulting Group Inc. in Ann Arbor, Mich.

"If they improve efficiencies between functional groups, it's going to have a big effect on costs. Not \$3,700, but significant savings," he said.

GM's Szygenda said he agrees with that. "The company that links design, procurement and sales — and puts it all to-

## 'Personal Coaches' Help Execs 'Get' the Net

*Move to e-GM strategy requires 'car guys' to become 'tech guys'*

BY JULIA KING  
DETROIT

Two years ago, Harold Kutner, group vice president of worldwide purchasing at General Motors Corp., had never even popped the cover off a laptop computer.

Today, he carries one wherever he goes. He buys his golf clubs and tracks the stock market online and is a regular groupie on certain Internet sites.

"I love to go on eBay and watch auctions or to Fulton Fish Market online," Kutner said.

Mark Hogan, another longtime GM executive who heads the automaker's 9-month-old Internet commerce unit, is a self-described "car guy" more so than a tech guy. But, thanks in part to the help of a "personal technology coach," Hogan is also now a proficient user of a PC and the Internet.

Like all senior executives at

Detroit-based GM, Hogan and Kutner rely almost exclusively on both tools throughout the course of their daily work, meetings and travel.

They have to, according to CIO Ralph Szygenda. "It's not just about selling cars and

trucks anymore," Szygenda said.

Even Szygenda has a personal technology coach — a 28-year-old employee of Compaq Computer Corp., a key supplier of desktop technology to the automaker.

"I'm supposed to be CIO of the world's largest company, but I didn't grow up with the Internet," Szygenda said.

Like all executives, Szygenda dedicates at least an hour each

week to being coached in new Internet technologies.

Indeed, if GM is to successfully transform itself from purely a car and truck company to a provider of information services, its executives must be technology-savvy. Szygenda, GM's chief Internet strategist, has helped get them there by "wrapping technology around them wherever possible."

The personal technology coaches were just the beginning. All of GM's major divisions now have their own CIOs, all seasoned technology

### GM: The Numbers Tell the Story

**\$3.2B**

GM's annual IT budget

**\$87B**

GM's annual expenditure on parts

**\$600M**

GM's projected investment in TradeXchange this year

**\$50B**

Projected value of TradeXchange transactions by end of next year

**\$1.6B**

GM's investment in electronic business to date

**8.5M**

Number of cars and trucks GM makes per year

**150,000**

Current number of OnStar subscribers

**1M**

OnStar subscribers expected by year's end

**1.5B**

Hits on GM's BuyPower Web site since 1997

**4.5M**

Number of BuyPower Web site hits per day

gether electronically — wins.”

Overall, Szygenda estimates that GM has invested about \$1.6 billion in its various electronic-business initiatives, which in turn have reduced the company's annual IT budget by about \$800 million each year since 1996. (The reductions have come from retiring legacy applications and streamlining business processes and systems.) The company's 2000 IT budget is \$3.2 billion.

Once it makes and sells a car, GM will extend its revenue-earning power by delivering Internet-based services through its OnStar system to drivers of Web-ready cars.

“This fall, GM will be the first carmaker to offer Internet connectivity in the vehicle,” said Mark Hogan, head of GM's e-GM unit, which functions as the company's headquarters for all consumer-oriented electronic-business initiatives.

From there, Hogan envisions services including customized stock reports, MP3 music downloads and individually programmed satellite radio services, and not just to drivers of top-of-the-line models or

the 1 million OnStar subscribers GM will have signed up by year's end. By the end of next year, Internet connectivity will be standard on GM's midsize models as well.

### Hands-Free Deal

In addition, GM has a deal with Bell Atlantic Corp. to provide hands-free, voice-activated Internet service to cars anywhere in the U.S. The automaker also is in the process of forging partnerships with various content providers, said Chet Huber, general manager, of GM's OnStar unit.

“GM has supported us in making this business as big as we can as fast as we can,” Huber said. That includes selling the OnStar technology to competing carmakers — another key ingredient in GM's electronic-business strategy.

Because of its OnStar technology, Huber estimated that GM now has about an 18- to 24-month lead in Internet connectivity over other automakers.

“But as GM rolls these vehicles out, other manufacturers will do the same,” he noted. It makes sense for GM to take ad-

vantage of its lead by selling the technology, then collecting subscription revenue on an ongoing basis, said Huber.

By the fourth quarter of this year, Huber said, he expects to be signing up 5,000 new OnStar subscribers per day.

“Through OnStar, GM has the potential to be the country's largest reseller of cellular services,” he said.

Yet some auto analysts aren't as optimistic about ongoing electronic-services revenue.

“I'm skeptical. I'm not at all optimistic about investing in telematics like OnStar and e-mail and cell phones and safety things,” said Saul Rubin, a financial analyst at Warburg Dillon Read LLC in New York.

One reason: “There's a good chance that these extra services will become like other types of components that automakers have to offer to become competitive — and not something that gains extra revenue,” Rubin said. ▀

### MORE THIS ISSUE

For more information on GM's e-commerce plans, see page 20. For more on its OnStar plans, see page 66.

## The Transformation From GM to e-GM

► **JUNE 5, 1985** GM buys Hughes Aircraft Co. for \$5B.

► **FEB. 9, 1996** GM announces OnStar, a satellite-based vehicle communications system.

► **JUNE 28, 1996** GM hires Ralph J. Szygenda as CIO from Bell Atlantic.

► **MARCH 10, 1999** GM launches its consumer car-shopping site, **GMBuyPower.com**.

► **MAY 19, 1999** General Motors Acceptance Corp. announces **CyberLot**, a Web site for auctioning former lease vehicles to dealers.

► **AUG. 10, 1999** GM forms a new business group, called **e-GM**, to focus on e-commerce initiatives.

► **NOV. 2, 1999** GM and Commerce One announce plans for a business-to-business e-commerce market.

► **NOV. 3, 1999** GM unveils an OnStar-based system to deliver personalized Web-based information such as news, sports and e-mail to cars with Internet access.

► **NOV. 10, 1999** GM's OnStar unit takes a \$15M equity stake in **General Magic**, which makes the voice-activated interface for OnStar.

► **NOV. 17, 1999** GM and Commerce One launch **GM TradeX**.

change for business-to-business auctions in the automotive industry.

► **DEC. 16, 1999** GM's Saturn unit rolls out an e-commerce network involving Autobyte.com, Autoweb.com and AutoVantage.com.

► **JAN. 9, 2000** GM and America Online Inc. announce an alliance to create car-buying areas on AOL and to explore possible delivery of AOL content via OnStar.

► **JAN. 13, 2000** GM's Hughes Electronics Corp. announces it will shed its satellite launch business and focus on high-growth communications and information services.

► **FEB. 25, 2000** Ford, GM and DaimlerChrysler announce plans to combine their business-to-business e-commerce markets into a single entity.

► **MARCH 31, 2000** GM's annual report discusses great potential in e-commerce and views the GM vehicle as “a rolling platform for a whole range of in-vehicle communications products and the subscription fees that go with them.”

► **APRIL 5, 2000** GM signs cellular network services partnership with **Verizon Wireless** and announces **Communiport Infotainment** system for Cadillacs.

executives whom Szygenda personally recruited from other industries. Szygenda himself came to GM, as its first CIO, from Bell Atlantic Corp. in 1996, just as the automaker was cutting its longtime information technology ties to Electronic Data Systems Corp. in Plano, Texas. At the time, GM “had maybe 100 Web browsers in the whole company,” he recalled. But it also was starting with a clean, post-EDS slate.

It took Szygenda more than a year to interview 270 people for the top 30 IT slots at GM. He said his strategy was to “tag-team heavy-duty IT people with car experts.”

“When I came here, I thought recruitment would be a problem,” he noted. “After all, Detroit is not the tropics.”

Szygenda said he sold the recruits on GM by playing up this once-in-a-career opportunity to help “transform the world's largest company.” Most of them jumped at the opportunity, he said, although he acknowledged that six-figure salary-and-bonus packages — plus a new car every quarter — helped immensely. “These people are making a lot of money,” he noted.

**This fall, GM will be the first carmaker to offer Internet connectivity in the vehicle.**

MARK HOGAN,  
PRESIDENT, E-GM



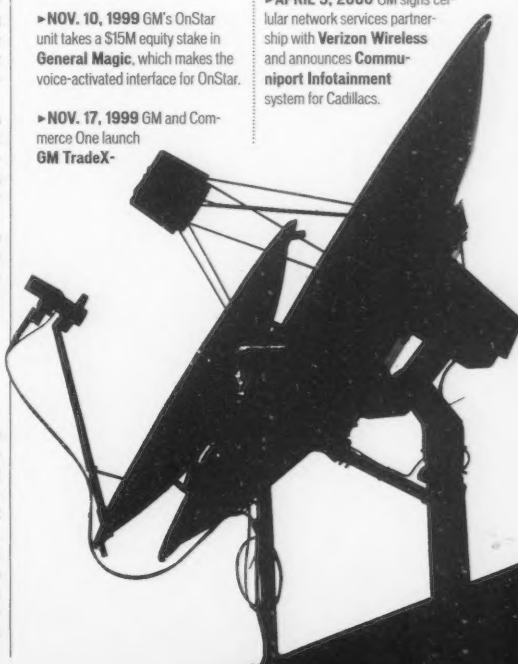
Once they were onboard at GM, the automaker brought in an organizational psychologist to work with the group members to mold them into a team, Szygenda said. This was imperative, since virtually every Internet-based business and IT project at the \$176 billion company requires a group effort

that transcends organizational boundaries. There can be no turf wars or lone rangers, Szygenda said. “The worst thing you can do here is not want help,” he said. “The scale at GM means you're going to co-manage, no matter what.”

Four years later, GM has “thousands of [IT] development projects going on,” said Szygenda. Yet project management is a critical challenge that GM may have miscalculated at first.

“We underestimated the magnitude of managing any number of projects and out-sourcers, and projects have gotten off track,” Szygenda said. “I have meetings every month about projects not going well.”

To help remedy the situation, GM has built a project management group of 1,500 people. The company also now measures the progress of all projects as well as executives' performance against 92 electronic-business metrics. These include things like the number of customers who come in contact with GM via the Internet and the percentage of Web-enabled vehicles the company sells. ▀

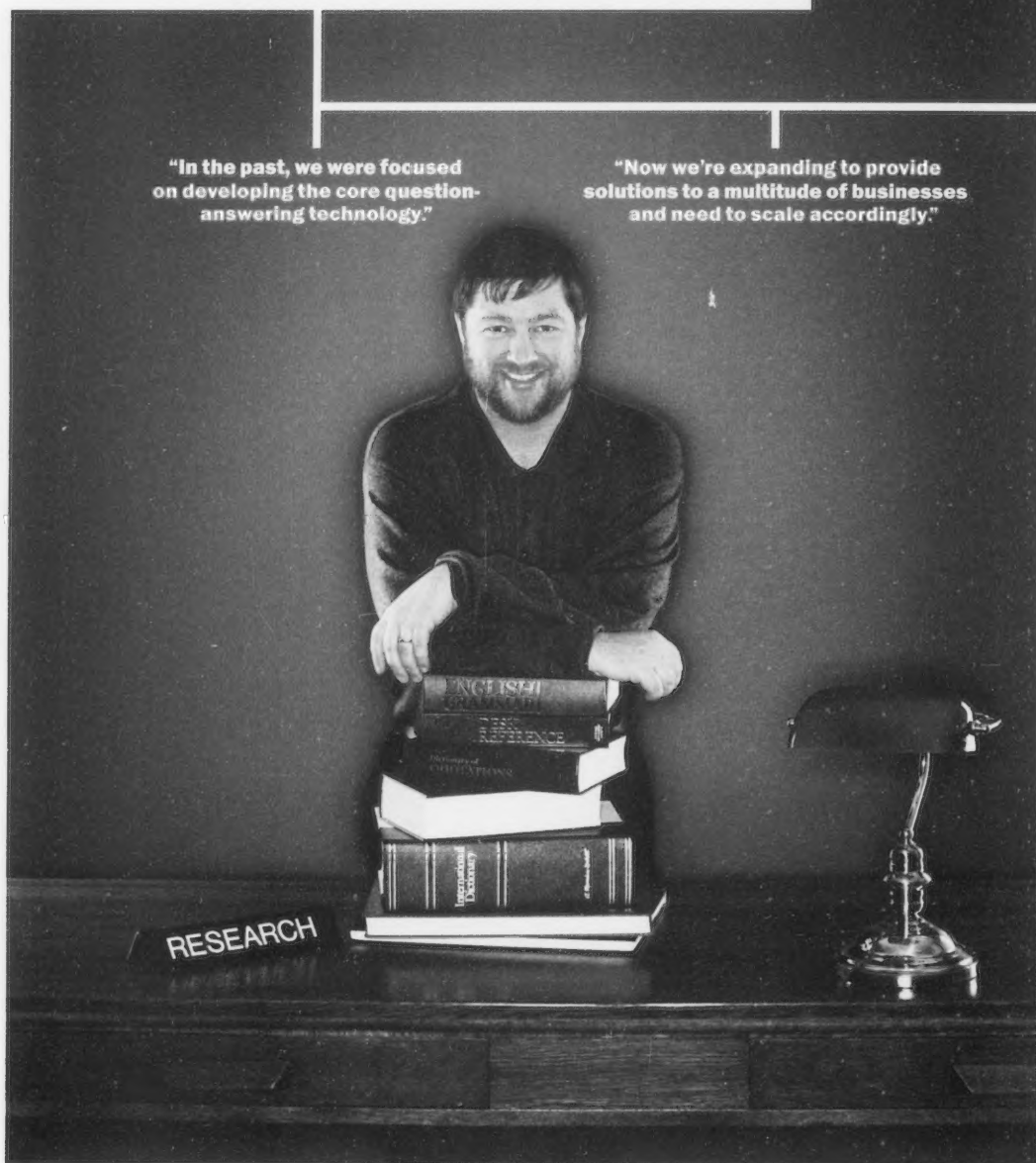


David Warthen, Chief Technology Officer, Ask Jeeves

**"One of our biggest challenges was to take something that's really hard to build—natural language Web querying—and disguise the complexities to make it easy to use."**

**"In the past, we were focused on developing the core question-answering technology."**

**"Now we're expanding to provide solutions to a multitude of businesses and need to scale accordingly."**



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# GM Lures Consumers With OnStar Service

*In-car Web and cellular technology comes with high expectations, but some are leery*

BY LEE COPELAND  
DETROIT

CONVENTIONAL wisdom is that automatic transmissions and all-wheel drive are what turn tire kickers into car buyers. But now General Motors Corp. is luring consumers with in-car Internet and cellular services, hoping to spruce up the staid image of its brands and to recharge sales.

Detroit-based GM originally launched OnStar in Cadillacs in 1996 as an emergency concierge and road service. The OnStar communications system, which received a technology boost from GM's high-tech subsidiary, Hughes Electronics Corp. in El Segundo, Calif., combines a Global Positioning System (GPS), cellular technology and an around-the-clock service center.

OnStar fees start at \$195 for an annual subscription. In a pinch, frazzled drivers can get their car doors unlocked, receive step-by-step directions or get emergency assistance from the OnStar service center. Last November, GM unveiled plans to improve the onboard cellular system and transform it into a platform for delivering Web-based e-mail and content. Earlier this month, GM added voice-activated cellular calling to its OnStar menu.

David Cooperstein, an analyst at Forrester Research Inc. in Cambridge, Mass., said adding services like OnStar is something GM had to do.

"Whether or not it's true, GM's brands are considered stodgy and of low quality, and GM's market share is low for them," he said. "OnStar gives GM a way to promote their brands, which are having trouble surfacing on their own. GM is trying to get out in front of the trend — instead of waiting for the trend to happen and then be a fast or slow follower behind it."

Indeed, GM was the first au-

tomaker to announce Web services in its vehicles. But Dearborn, Mich.-based Ford Motor Co. also plans to introduce Web capabilities in its 2001 models this fall.

OnStar now comes standard in GM vehicles, rather than as a dealer-installed option. It's one of the many "small bets" that GM President Rick Wagoner wants to wager to keep the company innovative. Although officials won't disclose the costs of developing OnStar, it's likely that the price tag was much cheaper than that of launching a \$500 million new vehicle line, Wagoner told *Computerworld* (see story below).

GM expects to roll out 1 million vehicles with embedded OnStar systems by year's end, in 31 different models. While GM has managed to woo more than 150,000 subscribers and says it's signing up more than

5,000 new subscribers each month, the automaker has yet to win over critical Wall Street and industry analysts.

Automotive analyst Jim Hall at AutoPacific Inc. in Tustin, Calif., said GM's OnStar initiative presents a variety of financial hazards for the automaker: It departs from GM's core business; the price point on cellular services keeps dropping; and as Ford and other auto-

makers follow suit, cellular services will become standard and won't be a competitive differentiator.

"A lot of OnStar's services can arguably be provided more economically by an outside supplier," Hall said. "The concierge service could be done by your cell phone supplier, and the people [providing the service] would not have to be given GM paychecks and GM benefits."

Seth Glickenhau, a partner at New York investment firm Glickenhau & Co., which owns nearly 293,000 GM shares, said Internet and cellular services are interesting features, but

GM still is "not getting at the fundamental problem, which is the style of their cars."

"GM used to have 50% market share, and now they barely have 30%," he added. "They will end up with 20% if they do not sharpen up design and manufacturing and build vehicles that young people want."

To assuage critics, GM is considering spinning off the OnStar business unit and is distancing itself from Hughes, the subsidiary that provided the technology know-how to get OnStar off the ground.

GM has already announced plans to reduce its holdings in Hughes to 35%. The pledge was greeted with an enthusiastic response from financial analysts like Glickenhau, who said he believes that GM should sell its investment in Hughes.

GM acquired Hughes in 1985 but has since sold its defense business unit and its satellite launching and manufacturing business. Hughes now focuses on communications, wireless systems and its satellite broadcast company, DirecTV Inc. Even with less dependence on Hughes, Cooperstein said, OnStar will give GM an advantage over other car companies. "In order to get reward, you have to take risks," he said. ▀



## Wagoner: GM Embraces IT

*President wants service revenue*

BY JULIA KING  
DETROIT

General Motors Corp. President and soon-to-be CEO Rick Wagoner said he has seen the light about tapping information technology to unleash a river of new revenue from an old-line car manufacturing company.

"The value of good IT and applying it is huge, and there has definitely been a shift at GM," Wagoner said recently during an exclusive interview with *Computerworld*.

In particular, "the potential value drivers with e-business are as big as anything I've seen in 20 years in the industry," said Wagoner, who will become CEO June 1. New electronic-business initiatives, such as TradeXchange and GM's ex-

panded OnStar program, "have the chance to change our basic business," he added.

He offered GM's new OnStar initiative as a prime example. By 2003, GM will have rolled out 4 million Web-ready cars. Previously, OnStar was installed as a value-added service by dealers.

The company also plans to sell its vehicle-based Internet technology to other carmakers. After that will come a slew of information services delivered to tens of millions of drivers on a subscription basis.

"A customer's automotive experience isn't just their new car or truck anymore," Wagoner said. "Now, we can expand the relationship and revenues plus drive up the stock price, [because] you buy OnStar services every month."

In the just-released 1999 annual report, GM executives also emphasized the vast im-

**A customer's automotive experience isn't just their new car or truck anymore.**

RICK WAGONER, PRESIDENT,  
GENERAL MOTORS CORP.



portance of the Internet coupled with the company's gigantic footprint in the auto market.

"More than 70 million Americans own GM vehicles, and

every year more than 8 million people around the world buy new GM vehicles, each of which could be considered a rolling platform for a whole range of in-vehicle communications products and the subscriptions that go along with them," read the letter to shareholders.

GM also has the potential of becoming one of the largest resellers of cellular services, plus it has a built-in audience for car loans and home mortgages offered through its General Motors Acceptance Corp. division, he noted.

One big bonus for GM is that trying out new electronic businesses isn't as costly as trying out new models of cars, Wagoner said. "We're used to a business where you make a billion-dollar bet and see how it turns out five years later," he said.

By comparison, GM has invested \$1.6 billion in Internet-based commerce since 1996.

With e-commerce, "we're making smaller bets and finding out immediately," he said. ▀

# Can IT Managers Be Heroes?

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## AT&T Outsourcing Deal Will Cover 150 Apps

BY JULEKHA DASH

AT&T Corp. has signed a \$1 billion, seven-year outsourcing agreement to turn certain

information technology operations over to Computer Sciences Corp. (CSC) as a cost-cutting move.

CSC will provide application development and maintenance for 150 applications — such as billing, credit and cus-

tomers care — within AT&T's consumer services division.

The agreement reached this month calls for more than 600 AT&T employees in New Jersey and Texas will work for El Segundo, Calif.-based CSC.

AT&T's contract replaces a 10-year, \$300 million outsourcing deal that the communications company signed with CSC in March 1999.

Ironically, IT vendors, which tout their technical expertise, are increasingly using outside parties for support services while their internal IT staff works on higher-priority projects, said Albert Nekimken, an analyst at Input, a market research firm in Vienna, Va.

For instance, Electronic Data Systems Corp. in Plano, Texas, and MCI WorldCom Inc. signed a two-way outsourcing deal worth \$12.4 billion last October.

"All of the IT companies in recent years have discovered that the benefits of outsourcing apply to them as well," Nekimken said. "AT&T decided that it had other things that were [of] higher value to do."

According to Input, the market for IT support services is projected to grow from \$35 billion this year to \$121 billion five years from now.

### Details Are Guarded

For competitive reasons, AT&T is closely guarding the details of its arrangement with CSC. But AT&T spokeswoman Lee Ann Kuster said the deal is part of CEO Michael Armstrong's plan to reduce costs by \$2 billion this year.

Kuster couldn't say how much money AT&T would save from this deal, but she did say the company would save labor, systems support and management costs. In addition, outsourcing would allow AT&T to tap CSC's expertise in application management while its own staff concentrates on core projects.

So how exactly does spending \$100 million per year save a company money? "The assumption is that [AT&T] will earn more money by taking other work for other companies, presumably at a higher margin," Nekimken said. He added that vendors guard information about their own outsourcing so it doesn't appear that they lack enough people to handle their own IT needs.

Howard Rubin, research fellow at Stamford, Conn.-based Meta Group Inc., said that companies in the telecommunications and financial services industries are under pressure to outsource to compete with start-ups. ■

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## BRIEFS

Mobile Phone Makers  
Team on E-Commerce

Motorola Corp., LM Ericsson Telephone Co. and Nokia Corp. last week announced a joint project to create an open industry framework for secure, mobile electronic transactions. The companies said the Mobile Electronics Transactions framework, which is based on existing and emerging global technologies, will be to commerce security what the Wireless Application Protocol is to the Internet.

## CA Shrinks Divisions

Organizations that use - or might use - tools and services from Computer Associates International Inc. should be hearing from fewer CA representatives because of a reorganized sales and customer service department. The reorganization of Islandia, N.Y.-based CA is only a first step, according to Sanjay Kumar, CA's president and chief operating officer. "We're embarking on an initiative to re-engineer our business to more aggressively support e-business," he said.

## Intel Opens Code

Intel Corp. last week said it plans to offer an open-source version of its software based on the Common Data Security Architecture as a free download. The move is intended to encourage use of the software by letting software developers review the code for possible flaws and to provide Linux users with a common security architecture.

CMGI, Sun, Novell  
Form Net Venture

CMGI Inc. in Andover, Mass., last week announced a collaborative venture with Novell Inc. and Sun Microsystems Inc. to create and deploy technology to improve the flow of Internet traffic by optimally profiling content. The venture, called CMGIon, will use directory and caching technologies to direct Internet traffic at the network level, augmenting server- and user-level anonymous profiling, company officials said. Novell and Sun are each investing \$20 million in the venture, which is majority-owned by CMGI.

IDC: More People  
Paying Bills Online

Predicts market revenue of \$1B in 2004

BY LINDA ROSENCRANCE

**G**ROWING numbers of people who are opting to pay their bills over the Internet will create a \$1 billion market for transaction-fee-based online payment processing by 2004, predicts research firm International Data Corp. (IDC).

While the future looks promising for electronic bill presentment and payment (EBPP), analysts said the click-and-pay market is still in its infancy. EBPP is the process that allows bills to be created and delivered online to consumers, who then pay the bills online through their financial institutions.

According to a report released last month by Framingham, Mass.-based IDC, worldwide revenue from EBPP pro-

There is  
unbelievable  
interest in  
every quarter.

MICHAEL KILLEN, CHAIRMAN,  
KILLEN & ASSOCIATES

cessing fees jumped 540% last year to \$32 million.

Michael Killen, chairman of Killen & Associates, a Palo Alto, Calif.-based market research company that specializes in EBPP, agreed that while the concept is young, its potential is enormous.

"We are in the early stages of

big billers adopting [electronic bill presentment]," Killen said. "But there is unbelievable interest in every quarter."

## Millions Will Pay Online

According to Stamford, Conn.-based Gartner Group Inc., by 2002, 15 million U.S. households will be paying their bills online. Currently, however, consumers would rather lick their stamps than pay a bank fee for the online service, Gartner said. It estimated that four out of five banks currently charge a monthly fee that averages \$6.

IDC said consumers will begin the shift from paper to electronic bill payment once more financial institutions and other firms begin to incorporate EBPP technology into their e-commerce platforms. Businesses also need to convince consumers that these transactions are secure, IDC said.

Alan Alper, an e-commerce

analyst at Lincoln, Mass.-based Gomez Advisors Inc., said EBPP may become more widely accepted once an industry standard for exchanging financial data with financial institutions, consumers and businesses is adopted.

"Right now, the process isn't totally electronic," Alper said. "Paper checks are still being cut by banks because [their systems and the systems of the payees] are not compatible."

And although there is currently a common protocol - the Open Financial Exchange - that would allow firms to integrate their systems, Alper said it hasn't taken off, in part because banks are reluctant to adopt a system they feel could cause them to lose control of their information.

To complicate matters, a second standard is emerging.

Spectrum, a joint venture of The Chase Manhattan Corp., First Union Corp. and Wells Fargo & Co., said it will adopt the Interactive Financial Exchange (IFX) protocol later this year.

IFX is being developed and promoted by the IFX Forum, an organization that comprises financial institutions, billers, insurance companies and vendors. ■

Lucent, TeraBeam Plan to  
Clear Last-Mile Bottleneck

Announces new  
fiberless network

BY JAMES COPE

The last-mile bandwidth bottleneck between the enterprise and high-speed access points has been a problem in search of a solution. A fiberless optical network system being backed by Lucent Technologies Inc. may be the answer.

Last week, Murray Hill, N.J.-based Lucent announced that it has entered into a joint venture with TeraBeam Networks Inc. in Seattle to develop and deploy TeraBeam's through-the-air multipoint optical networking system.

The two companies will form TeraBeam Internet Systems, a venture scheduled to

begin commercial deployment of TeraBeam's fiberless optical network later this year. Lucent will take a 30% stake in the company, while TeraBeam will retain 70% ownership, the companies said. All hardware used in the TeraBeam system will carry the Lucent brand.

## No Fiber

The TeraBeam technology is optical, but it doesn't use fiber-optic cable, said Dan Hasse, CEO of TeraBeam. Rather, the TeraBeam system uses lasers to carry network traffic through the air to office buildings. No rooftop permissions or cable rights-of-way are needed, according to Hasse, because the user network sending and receiving device, which looks like a small satellite dish, can be placed be-

hind an office window pane.

Moreover, since the system uses light waves instead of radio frequencies, licensing of wireless radio spectrum isn't an issue.

Also, because the system is point-to-multipoint, one TeraBeam hub can serve multiple buildings, Hasse said.

Commercial rollout of what's essentially an optical broadcasting system is a concept that Chris Nicoll, an analyst at Current Analysis Inc. in Sterling, Va., described as "very compelling."

"We're not just talking wireless from a customer to a base station," Nicoll said. "You could [network] a whole metro area in a matter of days. Municipalities like Boston and Washington would probably appreciate using TeraBeam instead of tearing up streets [to bury fiber-optic cable]."

As with radio wireless, there are questions of reliability and interference from weather, Nicoll said. It's unlikely the TeraBeam technology will re-

## AT A GLANCE

## TeraBeam

## Performance claims

- Sends and receives data on laser beams through the air
- Point-to-multipoint - one hub connects multiple buildings
- Gigabit speeds

## Benefits promised

- No special structures or towers - user's optical transceiver works from behind building windowpane
- Last-mile connections without an existing fiber-optic infrastructure

## Questions

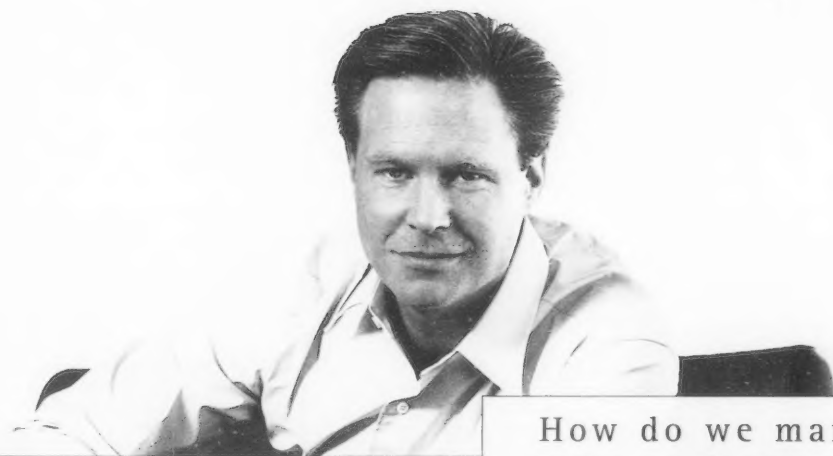
- Cost
- Reliability and effect of weather on signal
- Unforeseen environmental constraints

place existing fiber-optic infrastructure, he added, since there isn't any reason to replace fiber that's already buried. The new technology will be attractive in places where there's no existing fiber, he said. ■



CORIO

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George Bell, President, Excite@Home

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MARYFRAN JOHNSON

## Dot-com bashing

**T**IMES ARE SUDDENLY tough for the dots. A volatile, punishing stock market has cast an unflattering light on some rapidly deflating paper fortunes. Consumer and retail sites are being eulogized and dissected while their little hearts are still pounding. Law firms are staffing up

to handle bankruptcies (so nice to know the lawyers won't go hungry).

The same breathless hype that last year heralded the dot-com phenomenon is now predictably, inevitably, turning against the Web sites. When one health site bombs (à la DrKoop.com), they're all about to blow up. When one on-line grocer fumbles (à la Peapod), the rest suddenly seem to be all thumbs. When one music site hits a bad note (à la CDnow.com), they're all out of tune.

There's nothing like blood in the water to bring analysts and irate investors swimming in for a good feeding. Last week, we ran a story on our site that quoted a Forrester Research report huffing about the "imminent demise" of most dot-com retailers. Other media outlets jumped on it, too, if only for the sheer calculated drama of that quote. That same day, an alert *Computerworld* reader suggested that publishing such hyperbole without investigating the underlying causes



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"just alarms people and adds little value." I couldn't argue with that.

The unfortunate truth is that more than 80% of small businesses fail every five years or so, and nobody much notices. That same statistic applies online, but the process is going to be painfully public. It will take place in the klieg lights of the Internet, not on the streets of Everytown, U.S.A.

IT professionals know how e-commerce can brutally expose a company's internal systems problems (just ask eBay or ETrade). But technical problems are fairly easily solved. The harsh reality is that the Web also exposes a bad business idea, smarter competitors, an unrealistic revenue plan or just a fatal lack of focus. The e-commerce sites that will survive — and thrive — will be the ones where technology and business come together to truly serve a need. There are still plenty of those.

So let's take the dot-com bashing with a few grains of salt. It's just history repeating itself. ▀

DAN GILLMOR

## Net tax panel failed to resolve a crucial issue

**P**RESIDENTS ARE frequently displeased to discover that their Supreme Court appointees turn out to be real people with their own minds, and not doctrinaire automatons who vote as the White House desires. Leaders of Congress learned a similar lesson recently with the Internet Tax Commission, which wrapped up its work last month with a muddled whimper instead of the expected antitax diatribe.

Even after stacking the commission with antitax zealots and technologists whose businesses would gain in a no-Internet-taxes environment, Congress didn't get the two-thirds "supermajority" it had demanded in any final recommendations.

Only by a thin margin, and only after endorsing specific tax changes that — by amazing coincidence — worked in favor of the technology-industry members of the commission, did the panel even muster a slight majority in favor of keeping the Net a tax-free haven for the time being, if not forever.

What happened? Common sense began to assert itself.

There's little debate about parts of the report, such as a formal recommendation to study how new kinds of sales taxes on online purchases might invade consumers' privacy. That's a clearly necessary step.

But the overall question of Internet sales taxes defied resolution. The antitax crowd is delighted with the current situation, which gives Internet merchants a huge advantage over Main Street merchants through the use of a long-standing catalog-sales loophole to offer tax-free goods outside their home states.

But the tax-fairness side says the loophole not only undermines Main Street but will also surely lead to a loss of revenue for vital government services.

One of the more fascinating — and politically courageous — members of the commission was Utah's Republican governor, Michael Leavitt, who is hardly a card-carrying tax-and-spend liberal. Yet he emerged as the principal voice for the side



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of tax fairness. On the other hand, Virginia's Republican governor, James Gilmore, made no secret of his antitax fervor from the start. Give him credit for consistency, even if his policy would undermine communities all across America. The lack of a two-thirds majority didn't faze Gilmore. He figured, probably correctly, that the Republican-controlled Congress would simply accept the report and treat it like an official recommendation.

The requirement for a supermajority was sensible in the first place. This is a topic that needs overwhelming consensus. If we're going to set policies that will ultimately hollow out the tax bases of many states and cities, we should do so with our eyes open. We need equal forethought if we decide to put in place a system of Internet sales taxation, which won't be as simple as fair-tax proponents claim.

Instead, we've opted for paralysis. The negative effect won't be obvious during the current economic boom, when sales tax revenues aren't dropping in major ways, and not at all in most jurisdictions. But when the next economic downturn hits, we'll regret our refusal to face up to a serious issue. ■

JOHN GANTZ

## Wireless protocol is coming. Are you ready?

**NEWS FLASH!** By 2002, more people will access the Internet by phone than by PC. Did you know that? Do you have a plan in place to deal with that? Do you even know what a WAP phone is?



JOHN GANTZ is a senior vice president at International Data Corp. in Framingham, Mass. Contact him at [jgantz@idc.com](mailto:jgantz@idc.com).

I didn't until I heard my colleague Ian Gillot talk about this amazing development at a recent International Data Corp. conference. WAP stands for Wireless Application Protocol, now in Version 1.1, which has the backing of every major phone company and 200 other firms, including Microsoft.

With WAP, there will be a single protocol for delivering Internet access to cellular phones. The protocol can also be built into handheld devices such as PalmPilots, Windows CE devices and pagers. The protocol is promulgated by the WAP Forum ([www.wapforum.com](http://www.wapforum.com)).

Do you care?

You should. While the use of WAP phones to access stock prices or browse online catalogs via minibrowsers will be an important application, the *real* interesting applications will involve corporate uses. These include things such as the following:

**E-billing.** Consumers browse for goods online, get information and store locations, go to a store and pay for their purchase via their phone bills. This means interfacing your databases with those of the phone company.

**E-support.** Your customers get access to automated systems for first-line customer support, which is better than dialing direct to a call center. Select customers can get more personal treatment.

**E-commerce.** Customers use WAP phones to identify goods they want to buy online, but pay by using menus on their phones. This is more secure than sending credit-card information back and forth over the open Internet.

Of course, there are more exotic applications you can envision, including those that link with the Global Positioning System. Your phone could ring you when you're about to enter the vicinity of a particular watering hole, which could then offer you a special incentive to come in for a pop based on an electronic profile driven by your personal preferences.

No matter, these phones are coming. By the end of next year, it will cost more for handset makers to make non-WAP phones than WAP phones.

This should scare people in charge of corporate information systems for three reasons.

First, creating Web content that fits the tiny screens and limited keyboards will be an issue.

All that work to develop frame-rich, animated, snazzy content will be wasted. Your Web site will have to be WAP-compliant and contain HDML script, which is similar to but not exactly the same as HTML.

Second, managing a WAP phone fleet will be a problem, at least for applications such as sales force automation, inspection and order entry. Will you know who has which phones where, which access rights they have or which minibrowser? Have you tripled your support staff yet?

Third is creating real-time, mobile applications that work. Expect support and administration issues that are an order of magnitude worse than your typical remote-access headaches. For example, when was the last time you developed a real-time application that was location-dependent? In a mobile application, knowing a customer's location may be as important as knowing the size of his bank account.

Come to think of it, there may be some political problems to solve as well. A lot of companies still manage their phone services through a department that is separate from the IT department. Because voice will still be the foremost application for WAP phones, there may be disagreement over technology and vendor choices.

If these phones weren't going to wash over the planet so fast, we might be able to deal with them in an orderly manner. But they are. In the time it takes to implement a major SAP or Oracle upgrade, we'll go from zero to millions of WAP phones accessing our Web sites. And wireless Internet time will be much faster than Internet time. ■

## READERS' LETTERS

### Primary problems

**T**HE DEMOCRATIC primary election in Arizona wasn't quite as successful or as smooth as reported in the March 13 issue ["Arizona Makes Voting History," News].

To say that there was "one technical glitch" was a minor understatement. The problems were much more widespread and not just limited to old versions of Netscape Navigator.

On the PC side, users of the strong-encryption version of Navigator were also precluded from voting.

However, it's the Macintosh users who were totally left out. They were unable to vote whether using Internet Explorer or Navigator.

I received several letters from technically skilled members who analyzed the problem and determined that Election.com used a non-standard version of Java that was essentially supported only on modern Windows systems.

**Alex Podressoff**  
President,  
Arizona Macintosh  
Users Group  
Tempe, Ariz.

### 3Com customers will be fine with new path

**A**S A SYSTEMS engineer, I'm constantly on the lookout for the best hardware and values. I think the unhappy 3Com customers will soon find that 3Com has done them a big favor ["3Com

Dumps Enterprise; Users Miffed," Page One, March 27].

For those who don't know Extreme Networks Inc., its BlackDiamond switch is the new upgrade path for 3Com CoreBuilder users and has won Network/Interop Best of Show for three years in a row.

We've been using Extreme Networks products since they first came onto the market. They're the best-performing network hardware I've ever worked with.

Don't get me wrong; the Extreme switches have their limitations. They can't get you to the WAN without some additional hardware.

Extreme is firmly planted in the LAN. They don't talk to ATM,

FDDI, HIPPI or Token Ring. If you absolutely need these technologies, then Extreme isn't your solution.

But before you reject them on this point, talk to the company. I think you'll find that Extreme can build an all-Ethernet structure that can do whatever you need it to do.

**Bryan Johnston**  
Houston

*More Letters, page 32*

**COMPUTERWORLD** welcomes comments from its readers. Letters shouldn't exceed 200 words and should be addressed to Jamie Eckle, letters editor, Computerworld, PO Box 9171, 500 Old Connecticut Path, Framingham, Mass. 01701. Fax: (508) 879-4843. Internet: [letters@computerworld.com](mailto:letters@computerworld.com). Include an address and phone number for immediate verification.

DAVID FOOTE

## Consulting skills will help tech pros survive as IT fades

**T**HIRTY YEARS AGO, when the late artist Andy Warhol said, "In the future, everyone will be famous for 15 minutes," we all laughed at the



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statement's absurdity. But then came Jerry Springer and trash TV, tabloid journalism and now the Internet, where anyone can post his life story on a personal Web page for the world to view. In this spirit, I'd like to introduce "Foote's Maxim": In the future, every IT worker will be a consultant for 15 minutes.

The information technology department as we know it is vanishing. At

the current rate of change, it will probably be gone in about seven years. But not the IT worker, and certainly not the major contribution that technology makes in an economy where two-thirds of the gross domestic product is derived from technology-related products and services.

The problem of supply and demand in the IT labor force will worsen over the next several years, and not only will be able to keep pace with the skills race for full-time workers. Retraining isn't the answer because — let's face it — maybe 5% of us are capable of remodeling ourselves to rapidly fit into new jobs with new skills, then doing it again and again.

But what IT executives will do is reconstitute the workforce so that technical specialists are mainly contract workers, temps, part-timers, job sharers and consultants. The full-timers will be so-called business technologists (BT) with — you guessed it — strong consulting skills and abilities, plus varying degrees of functional, industry and technical know-how.

Over the past several years, companies have been steadily rebuilding their IT functions with BTs in critical project and decision-making roles. As companies draw more heavily from business units and consulting firms to fill key IT positions, manpower sourcing strategies have gravitated more aggressively to highly flexible, just-in-time models. And who better to enable this shift than small, niche-driven boutique consulting firms providing specialized top-notch services at competitive prices. These firms are helping fuel the estimated 16% to 20% annual growth in the IT services sector. Many of today's IT workers will end up as in-house BTs or as independent technical consultants at boutiques or larger

firms organized for more specialized services.

You may not end up being a full-time consultant, but having consulting skills will help guarantee your survival as an IT professional in a business-driven environment over the next several years. Pull those skills out when you need them, whether it's for 15 minutes, days, weeks, months or years. Here are a few:

- Focus on customer needs, whether the task is exciting or not.
- Be flexible in the way you approach tasks, and be able to identify ways to improve long-standing processes.
- Have a facility for risk-taking, especially accepting failure as a natural event.
- Tolerate ambiguity where there is no clear answer for what's right in a given situation.
- Be adaptable and flexible enough to make solid educated guesses, and be receptive to new ideas.
- Have a team-wise outlook aimed at developing and nurturing people working together.

Anticipate what internal customers will want before they know, but lead them to discover the answer in a highly participative fashion. ▀

SIMSON L. GARFINKEL

## U.S. shouldn't wait to enact privacy legislation

**T**HERE'S A GROWING disconnect between American consumers and business on privacy and data protection. Consumers want Congress

to step in and pass strong laws to protect information privacy, both online and off-line. A recent BusinessWeek/Harris poll found that 57% of Americans believe that "the government should pass laws now for how personal information can be collected and used on the Internet," while only 15% believe that voluntary privacy standards are the way to go.

Businesses, on the other hand, argue that the current voluntary standards are working quite well, thank you very much. What's more, say businesses, any regulation would be premature: We're still in the early days of the Internet boom, and any fiddling with the Net's magic formula of pervasive surveillance and unbridled personal data collection might irreparably harm the engine that has been creating so much of the country's new wealth.

But if information really is the oil of the 21st-century economy, then it's unlikely that privacy

will remain unregulated for long. Regulation, after all, plays many important roles in our society. By setting rules for business, regulation increases consumer confidence while creating a level playing field for all businesses.

Consider the biggest online privacy gaffes since early last year: DoubleClick, Amazon.com, Microsoft and RealNetworks were all caught off guard when details of their privacy-invading technologies and policies found their way onto the pages of Web sites, newspapers and magazines. The source of these companies' confusion was obvious: Nothing they were doing was illegal! Nevertheless, DoubleClick's cookies, Amazon.com's Purchase Circles, Microsoft's registration wizard and RealNetwork's surveillance jukebox all generated public outcry and hostility. Why? Because there's a yawning gap between the privacy rights most Americans think they're entitled to and what they're actually afforded under U.S. law.

This is an unstable situation, one not only unfair to consumers, but also unsettling to business. Innovative services for the information economy will depend on the judicious use of personal information, but companies that develop these services risk being branded as "privacy pirates," even when those services pose no privacy risk to the public. Meanwhile, companies that aren't building massive data banks still suffer the consequences when the public's fear of online privacy violations throws a monkey wrench into the continued growth of e-commerce. According to the BusinessWeek/Harris poll, 63% of those who don't shop online say they're "very concerned" that their personal information would be misused if they did.

Instead of fighting privacy legislation, industry should take the lead in developing a workable set of privacy regulations and practices that can work both on and off the Internet. These practices should take into account both the European Union's directive on personal information and the 1980 Organization for Economic Cooperation and Development privacy guidelines. After all, U.S. companies doing business in other countries already must follow local privacy laws based on these principles. The lack of defensible privacy legislation within the U.S. is fast becoming a stumbling block to international e-commerce, since many countries have laws that prohibit the transfer of personally identifiable information to laggard jurisdictions where privacy rights are not legally respected — like the U.S.

Like it or not, it's unreasonable to think that U.S. businesses will be able to stave off meaningful privacy regulation when the subject has such widespread appeal. The only question that's really open is: When will the regulation come?

Surprisingly, the answer is simple: the sooner, the better. Privacy protection will be a "must have" for worldwide e-commerce. The longer it takes for the U.S. to catch up, the further behind our companies will fall in privacy-protection practices and technologies. Likewise, the longer our companies spend harvesting ill-gotten gains from violating consumer privacy, the harder and costlier it will be for us to break that habit. ▀



SIMSON L. GARFINKEL (<http://simson.net/cha>) is chief technology officer at Sandstorm Enterprises Inc. in Cambridge, Mass.



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### E-commerce loyalty could be earned more easily with delivery boxes

**R**EGARDING DeWayne Lehman's article "Report: Customer Loyalty Is E-Commerce King" [Computerworld Online, March 31], I'd like to offer some evidence that suggests why e-commerce loyalty might be hard to get without implementation of a needed invention.

Online sales have the same delivery requirements as traditional mail-order sales; yet, according to the Census Bureau, mail order has never achieved more than 3.8% of U.S. retail sales.

For years, my company has operated a home pickup and delivery dry-cleaning route. Although our customers seem to love the convenience, only a small number of families in the neighborhoods we serve have been willing to give us a try. Why? I think it's because most people aren't home to meet our driver, and they're uncomfortable leaving clothes outside their doors.

Although we could try to deliver only when somebody's home, that would be both expensive and a hassle. Besides, even if the delivery guy showed up on time, will folks want to add another obligation to their already hectic schedules?

Whether it's laundry, groceries or other home-delivered goods, I believe e-commerce is in dire need of delivery boxes that enable security, convenience and loyalty for both merchants and consumers. One such product is MentalPhysics Inc.'s Internet-controlled residential delivery device.

**David Porter**  
Kansas City, Mo.

### On women and technology

**T**HANKS TO Kathleen Melymuka for her article "IT Women in Silicon Valley" [Business, March 13]. I've been in IT since 1966 and have seen much progress.

Early in my career, I noticed that some men used obscenities just so they could apologize for offending me by using "man talk." I finally came up with this response: "You're forgiven. I understand that men have a limited vocabulary." After that, the men with whom I worked seemed to make it a point of pride to demonstrate their breadth of nonobscene vocabulary. Many a dictionary was pulled out for the edification of one and all. I've found that I prefer to encourage desired behavior rather than dwell on and give attention to undesirable behavior.

**Bettymae B. Doyle**  
Bloomington, Ill.

**W**HEN DID *Computerworld* become a feminist platform ["IT Women in Silicon Valley," "A Millennium Agenda for Women in IT," Business, March 13]? I get tired of social engineering when I'm looking for technology engineering news.

Do you think playing up to these problems will win you a greater readership with an acknowledged minority, or do you enjoy trying to make men feel guilty over something over which they have no control? I won't be renewing.

**Andreas Barbiero**  
Manager of IT  
Livingston, N.J.

**I**N THE SAME ISSUE of *Computerworld* that contained Kathleen Melymuka's Ms. MIS column, "A Millennium Agenda for Women in IT," I found that almost all the IT ads featured men. No wonder women don't want to enter the field.

**Carole Greetham**  
White Post, Va.

### Is this how business is done?

**S**INCE WHEN do businesses like AOL, MCI and AT&T allow an arbitrary deadline to stop them from completing an important negotiation ["Consensus Eludes Internet Tax Meeting," *Computerworld Online*, March 21]? If "what we've really run into is the issue of time," why doesn't the Advisory Commission on Electronic Commerce just extend its deadline?

And if all it would have taken to come to a consensus was more time, why didn't they have more meetings before their deadline? Would any of these companies be where they are today if they treated business negotiations this way?

**Steve Orr**  
Boston

### Microsoft clarification

**M**ICROSOFT would like to provide clarification on the Code Librarian Update, a Web service for developers ["Microsoft Offers Free Components via Web," News, March 27].

On March 20, Microsoft launched the Code Librarian Update, a free monthly Web service extending support for Office and Visual Basic for Applications (VBA) developers, available at <http://msdn.microsoft.com/office/dev/>. Code Librarian is an extension of the Office 2000 Developer product, geared toward such developers, as well as Visual Studio developers who target the Office/VBA platform.

The Code Librarian Update offers code snippets, which are immediately reusable shortcuts for common development tasks. The Code Librarian Update does not offer code samples or source code. While 2.6 million developers target Office as a development platform or use Office in their solutions, this has no reflection on the number of developers using Microsoft application development tools.

Visio, the first contributor to the Code Librarian Update, will be followed by other third-party companies and Microsoft product teams. This expanded online code resource will reduce development time, expand developer knowledge and assist in team development for Office or VBA-enabled applications.

**Anders Brown**  
Lead product manager, Office 2000 Developer  
Microsoft Corp.  
Redmond, Wash.

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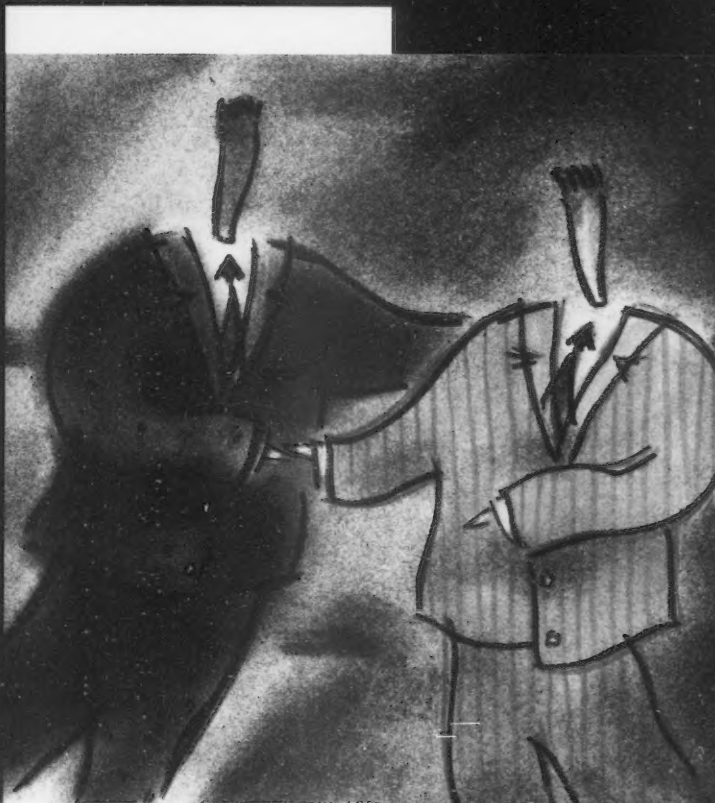
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White  
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APRIL 17, 2000



# Storage Networking: Integrating Corporate Cultures

COMPUTERWORLD



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## NETWORKING

# Integrating Corporate Cultures *To Benefit From* **SANs**

John T.  
McArthur,  
International Data  
Corp.

For companies that hope to gain the advantages of storage-area network solutions, the next great challenge is communication. But not the communication between fabric switches and loop switches, loop switches and hubs, storage systems and servers or storage management software and system management frameworks. The coming challenge has nothing to do with component, system or software interoperability. The next great challenge is the communication, or rather lack of communication, between data center managers and business unit executives.

As keynote speaker at a series of SAN seminars across the U.S. last month, I found that surprisingly few of the information technology and data center storage managers who attended reported being involved in their company's Internet, e-business strategy. And yet, if the initiative is to succeed, it is precisely this area that demands their attention.

More than any other area, e-business requires application reliability, availability and scalability. But more than that, e-business drives the need for data interchange between legacy (often mainframe) applications and Internet applications that interface with the customer. Security issues and the need for an open Internet interface mean that few companies will choose to provide direct access to legacy applications. Thus, data from the legacy application must be copied over to the Internet applications. But an e-business application puts control of transaction volume and timing into the hands of the customer, so the traditional batch window during which most data interchange occurs is no longer satisfactory as a method of supporting data interchange.

The dot.com phenomenon that is driving much of the current storage explosion is also driving the need for improved communication: communication among groups that are in the best of worlds in a state of truce, and more often perennially at war. Anyone with experience in dispute resolution knows that language, power and zealotry each play a role in the problem. These same factors will impact companies' ability to benefit from SANs.

#### Point of View

Companies and divisions within those companies make investments for a variety of reasons, all of which can be mapped to three basic business objectives: to increase revenue, decrease expense and reduce risk. It is along these lines that we





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As vice president of International Data Corp.'s (IDC) Worldwide Storage Research program, John T. McArthur establishes the worldwide and European research agenda for storage systems and for disk, tape and optical storage mechanisms. He also provides custom research and consulting for IDC clients on product requirements and marketing strategies for storage and storage-management solutions. He can be reached at [jmcarthur@idc.com](mailto:jmcarthur@idc.com).

see differences in how companies and departments view the role of IT. Before choosing a strategy for SAN deployment it is important to understand the perspective of the affected parties.

#### Centralized IT Management

IT managers as a group tend to focus their IT investments on decreasing expense and reducing risk. IT managers are measured on their ability to meet service-level agreements for application availability and their ability to stay within capital and operating budgets. Many of today's IT managers grew up in a mainframe environment. They have been trained to believe that reliability is the primary goal and predictability is a close second.

For the better part of the last decade, unscheduled outages due to component failure and microcode bugs were in the worst case rare and always viewed as intolerable. Because of dynamic upgrade capabilities and hot-swappable components, even scheduled outages for hardware and software maintenance and upgrades have been largely eliminated. In addition, many of today's high-end storage products reduce scheduled application downtime for batch processes such as tape backup, application testing and data exchange by employing products that support point-in-time copy functions. For the data center storage manager, performance and price almost always take a backseat to product reliability, the ability of the storage solution to support continuous application availability and the quality of a supplier's service organization.

For the data center storage manager, budgeting and planning is a quarterly or annual process. Growth, espe-

cially within mainframe data centers, tends to be predictable and moderate. Capacity planning and performance monitoring tools make impending problems easier to predict. Changes to the operating environment are typically planned and scheduled weeks or months in advance.

Though price is less important, efficient use of resources is important. Data center resources, whether storage capacity, data center floor space or skilled IT staff, are expensive. Therefore, the data center storage manager will adopt tools that allow more efficient use of storage capacity, reduce floor space requirements or improve the management efficiency.

From the perspective of the business, and particularly business unit executives, centralized IT is often viewed as unresponsive. Planning and budgeting cycles are too long and costs are too high. When viewed from the perspective of the typical business unit executive, centralized IT places too much weight on risk avoidance and not enough emphasis on responsiveness to new business requirements.

#### Business Unit Executives

The internet business unit executive, is concerned about time to market. Success is measured in revenue, customer and transaction growth. The internet business unit is concerned about using IT staff to drive revenue and is less concerned about reducing expense or risk. These executives expect that growth will be unpredictable and that planning cycles will be measured in either weeks or months, but certainly not years.

Suppliers are measured based on their ability to deliver storage capacity on demand. Capital preservation require-



ments and the anticipation of massive storage investments in the very near future drive some companies to lower-priced storage solutions. Especially during the "proof-of-concept" stage, e-businesses will invest less on feature and function that improves reliability or improves storage-management efficiency and more on raw capacity and performance. In addition, because initial requirements are often small, the ability to scale down, both in terms of capacity and function, is important in the early stages of implementation.

Within any successful organization, there are checks and balances. Auditors and risk-averse data center managers are there to protect the corporate interests against overzealous sales executives. When viewed from the perspective of the corporate officers, sales executives often place too much weight on sales growth and not enough emphasis on cost containment and risk avoidance.

#### Data Center Decisions:

##### Building an Enterprisewide Infrastructure

Companies will likely adopt SANs in three ways: strategic decisions based on centralized, top-down storage management directives; tactical decisions based on departmental operational needs; and business decisions that are the result of a multidisciplinary team approach to an information delivery architecture.

An enterprisewide storage infrastructure must support

the prevailing operating environments of Unix and Windows NT. For a significant number of companies, the infrastructure must also support a mainframe environment.

In businesses that have been around for more than a few years, the typical storage manager is experienced in OS/390 mainframe environments, high-end Unix environments or both. Only recently have some of these individuals expanded their focus to the Windows NT and Windows 2000 environments. In 2003, fully 85% of disk storage systems purchased will be attached to open systems servers

and more than half of those will be attached to Windows NT and Windows 2000 servers.

Each of the operating environments has its own set of business imperatives. For mainframe applications the imperatives are availability, reliability and predictability. For Unix environments, the imperatives are often scalable performance and capacity. For Windows NT environments, the imperatives are often low cost, rapid deployment and granular capacity upgrades.

One challenge for the data center storage manager is to be sensitive to each of these business imperatives to gain the trust of the application owners. A second challenge is to gain the budget responsibility and develop a chargeback mechanism to plan for and recoup the cost of this large expense. Finally, perhaps the greatest challenge is to gain approval of senior executives for this massive infrastructure investment, which may take years to yield a return.

**I**n 2003, fully 85% of disk storage systems purchased will be attached to open systems servers and more than half of those will be attached to Windows NT and Windows 2000 servers.

— *International Data Corp.*



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## COMPUTERWORLD

This White Paper was created by Computerworld Custom Publishing. Comments can be sent to editorial director Ellen Fanning at (508) 820-8289 or [ellen\\_fanning@cw.com](mailto:ellen_fanning@cw.com). This White Paper, as well as other custom supplements, can be viewed online at [www.computerworld.com](http://www.computerworld.com).

### Departmental Decisions: Creating Islands of SANs

SANs need not be deployed as enterprisewide solutions. Within large organizations there are often sufficient storage requirements at the department or division level to justify implementation of a SAN. Departmental SANs may help companies avoid the challenges of mixing operating systems, applications and workloads within a SAN. These SANs will more likely be viewed as solutions to specific problems and less as an infrastructure investment. Typical implementations will be initiated to facilitate LAN-free backup, justify automated tape backup and consolidate disk storage requirements for similar servers.

This departmental approach offers several advantages over enterprisewide SANs. Departmental SANs may avoid the expanded budgeting, justification and approval process that often delays enterprisewide solutions. Also, by focusing on specific business problems, firms that use departmental SANs are likely to achieve a rapid, more measurable return on the SAN investment and avoid cost overruns and implementation delays. Over time these SAN islands may be connected into a more enterprisewide solution, but that typically isn't the intention from the outset.

#### Building a Business-Focused Infrastructure with a Multidisciplinary Team

A similar approach has been used to develop enterprise data warehouses. The tremendous initial cost and the coordi-

ination and cooperation required often impede implementation of an enterprise data warehouse. Instead, many companies implemented departmental data marts to solve immediate information reporting and decision support requirements. Over time this initial investment in departmental data marts can be leveraged into a more enterprisewide data warehouse.

An enterprisewide solution requires the combined expertise of numerous constituencies, including storage managers, network managers, application managers and database administrators. How then should a company leverage these various constituencies to create an ideal SAN management team? One answer may lie in the multidisciplinary process outlined below.

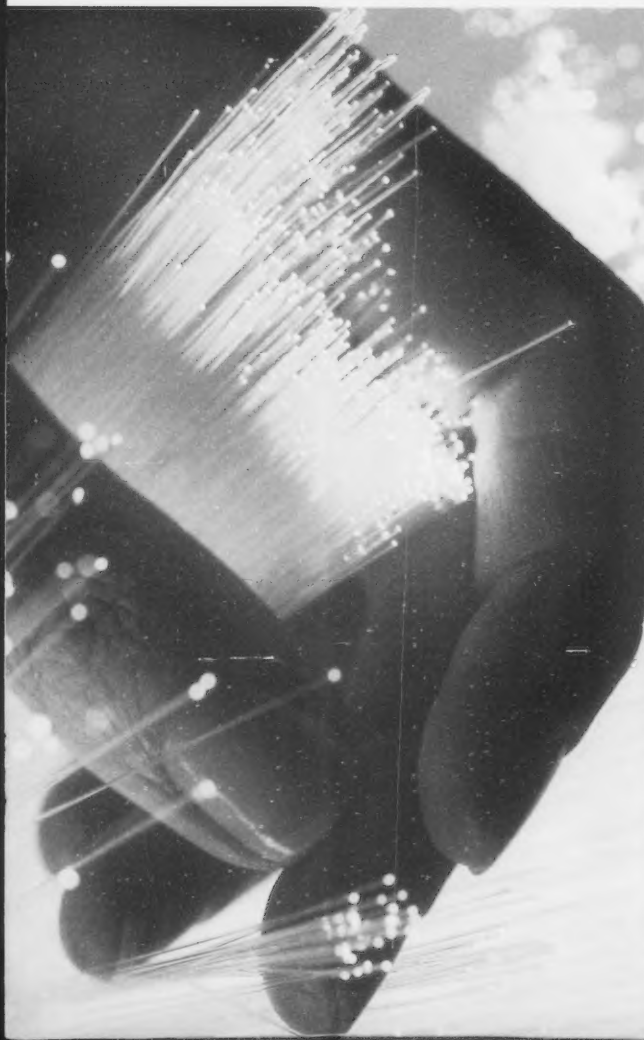
A multidisciplinary team for SAN implementation must include all individuals who are involved in application availability and performance. But just as important, the team must include business unit managers who can describe the business results they are trying to achieve. The key to success isn't in bringing all these individuals together to develop a storage infrastructure, but rather bringing them together to apply their combined expertise to these key business imperatives.

Because of the wide variety of operating environments, applications and business imperatives, no single individual

**B**ecause of the wide variety of operating environments, applications and business imperatives, no single individual is ideally suited to become the SAN architect or SAN administrator.

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is ideally suited to become the SAN architect or SAN administrator. Still, every team needs a leader. The leader can be from IT or the business unit, but the team leader must be able to evaluate issues from the perspective of the business, not from the perspective of storage or even the application.

#### Guidelines for Communication

The multidisciplinary team will face many challenges. Some of the biggest challenges will come from individuals in the team who have "Been there. Done that." Phrases that impede process include, "All you have to do is..." and "We've been doing that for years." A good rule of thumb is no anecdotes.

Jargon also impedes the work of a multidisciplinary team, and storage is replete with jargon. For example, while the OS/390 world deals in datasets and volumes, the Unix world deals in files and logical unit numbers. The answer isn't in debating the appropriate name, but in abandoning jargon altogether. Most of these technical terms can be recast into business-focused terms. In this example, then, access to "datasets" and "files" becomes simply access to "information."

Cross-training or retraining was once thought to be a cure for communication problems. Forced cross-training, however, tends to breed resentment. It also ignores the expertise, which was developed by the constituencies.

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#### Justifying the Investments Of a Multidisciplinary Team

A multidisciplinary team has several advantages over traditional datacenter or departmental solutions. A multidisciplinary team approach will avoid many of the dead-end investments by departments in solutions that don't scale in terms of capabilities, capacity or performance. At the same time, by evaluating solutions based on business imperatives, a multidisciplinary team will give more appropriate weight to solutions that support revenue growth and, while not ignoring cost and risk avoidance, will also not overweigh their importance.

As any business unit executive or investor knows, man-

aged risk is the key to above-average returns. This simple fact is often lost on risk-averse IT managers. By recasting storage infrastructure investments in terms of business imperatives, the multidisciplinary team has the greatest chance of achieving budget approval for these investments.

The growth in storage capacity and the current IT skill shortage demands a new model for information management and information delivery. Networked storage is the framework to deliver on this new model, and the solutions are real. Success will come to those companies that can organize to take advantage of these solutions. A multidisciplinary team approach improves approval and successful implementation. ▀

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## Case Study: *TechTarget.com* *Needed Storage, and Needed It Fast*

BY STEVE ULFELDER

The Dedham, Mass., start-up TechTarget.com, knew it had a great idea: It's a supersite for a portfolio of vertical-technology portals such as storage, AS/400, Windows 2000 and more. IT professionals can go to these sites for a cross-section of laser-focused information from vendors, analysts, the trade press and other sources. And that information is vetted and selected by editors who are experts in their fields.

Because the reports, white papers, trade-press articles and other site elements are judged on merit alone, visitors know they see the best information available about the area that appeals to them, regardless of the original publisher.

Brick-and-mortar businesses and dot.coms alike have come to appreciate the strategic value of their information. At TechTarget.com, that fast-growing database consists of voluminous information on various categories of IT pros. Knowledge of those readers' Web-surfing habits is much coveted by advertisers. Unlike competitors, TechTarget.com can aggregate profiles of users across its portfolio sites, according to Chief Technology Officer Patrick Laughran. "It gives us obvious leverage," he says. "We can provide buyers and sellers with targeted information."

Naturally, powerful search capabilities are vital to such a site. Busy visitors need the ability to perform very advanced searches very quickly. "We have industry-specific search engines," Laughran says, "and an

awful lot of editorial resources. Our business is built around managing a portfolio of these sites."

Time waits for no man, and that goes double when you're working at Internet speed. TechTarget.com launched in 1999. It now has six sites up and running. The mandate is to launch at least 19 more by the end of 2000.

It's no wonder that when Laughran was scoping out storage options, the top criteria were "Scale and speed. With the emphasis on speed," he laughs.

Not to mention performance. "The number of pages approaches 1.5 million for each site," Laughran says. "We have massive storage requirements." Moreover, "response times need to be optimized while we increase traffic."

Given these nonnegotiable demands, a storage-area network (SAN) made immediate sense, Laughran says. "Given our speed requirements, it seemed intuitively obvious that this is what we needed." However, building a SAN from scratch would be so difficult and time-consuming as to be nearly prohibitive. "We looked at the opportunities — [creating a SAN] in-house vs. outsourcing," Laughran says. But the company started in August with only three employees in its IT department. "It would have been impossible to build the infrastructure required for such a high-performance SAN," notes Laughran. "We just couldn't do it fast enough."

Having examined the options, Laughran turned to Storage Networks Inc. ([www.storagenetworks.com](http://www.storagenetworks.com)). The Waltham, Mass.-based company, founded in 1998,

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outsources storage needs by offering a utility model: Customers get unlimited, secure data storage on a pay-as-you-go basis.

TechTarget.com has added 1.5T bytes of storage with no implementation hassles, so it's no wonder Laughran describes himself as "pretty thrilled" with the service.

It's easy to understand the appeal of a SAN for a storage- and search-intensive operation such as TechTarget.com. A SAN is a high-speed, back-end network that's dedicated exclusively to storage. A typical SAN might include a server, any necessary storage devices and such networking hardware as hubs or switches. Most SANs are built around Fibre Channel, a high-speed transmission technology that uses the Internet Protocol and supports transmission speeds up to 4.25G bit/sec.

Experts point out that SANs have existed on mainframes for many years. It's the migration of the tool into the Unix and Windows NT arena that's new. And exciting: A recent report from Santa Barbara, Calif.-based Strategic Research Corp. calls SANs "the most important architecture to be adopted in distributed networking in the last 10-plus years." Strategic Research predicts the SAN market will rocket to \$27.2 billion in 2003 — nearly a 1,000% increase in five years.

The major difference between a SAN and network-attached storage (NAS), its cousin, is that NAS devices usually reside on a LAN, while a SAN is a network unto itself. While the strength of NAS is easy installation and convenience, its status as another node on the network may reduce performance. A SAN, on the other hand, can handle 100M bit/sec. throughput without breaking a sweat.

Laughran's team concluded that TechTarget.com's high-octane storage and search needs demanded a SAN. And there was no way the three-person IT department could build one quickly enough to suit a fast-growing start-up.

"People think start-ups will jump in and take any risk," Laughran says. However, he adds, the key at a young company is to choose your risks wisely. It's one thing to take a strategic chance in

an effort to trump the competition. It's another to gamble recklessly on a meat-and-potatoes technology such as network infrastructure. Or data storage. "Risk management is vital to us," Laughran says.

And the NAS option felt risky. "NAS might work down the road," Laughran says, "but ... SANs are more proven."

However, for all their benefits — lightening the load on data networks, increasing fault tolerance, improving

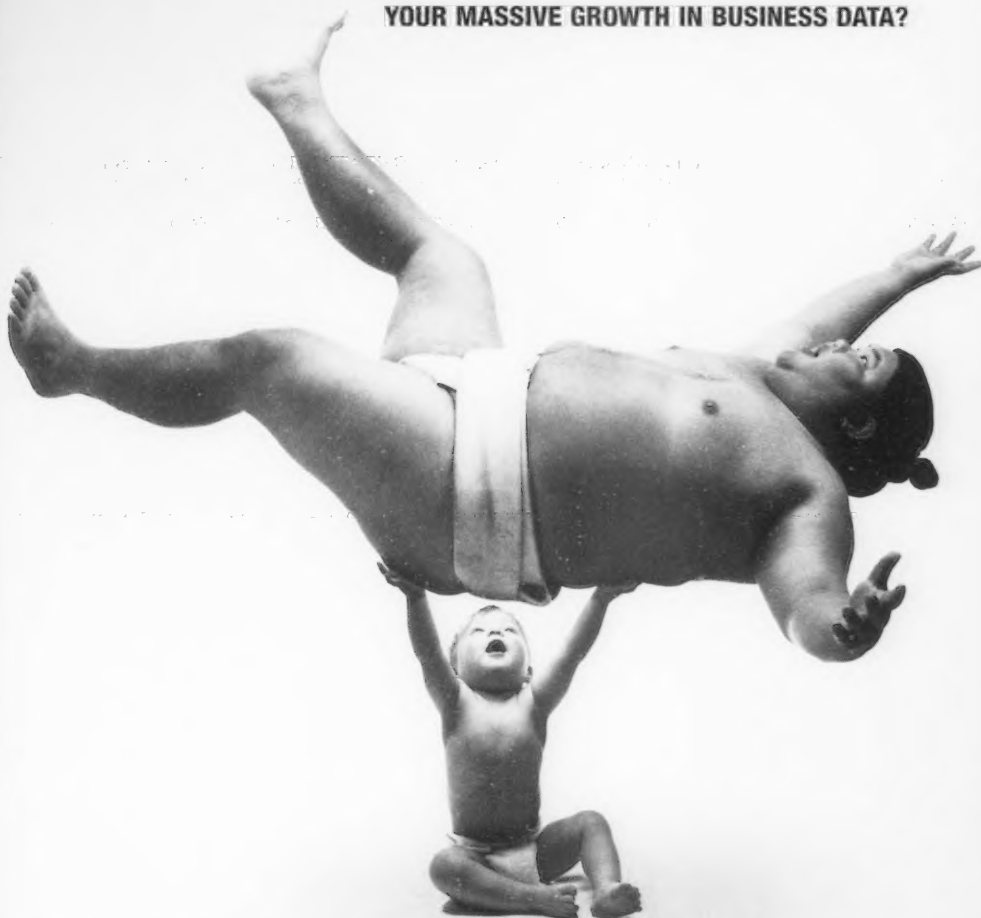
**"We have massive storage requirements. Moreover, response times need to be optimized while we increase traffic."**

**—Pat Laughran  
TechTarget.com**

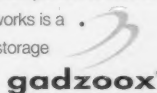
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efficiency — SANs have drawbacks. They require a steep up-front investment, experts say, and the expertise needed to implement and integrate them is formidable. That's where Storage Networks' model came in.

Storage Networks essentially takes the burgeoning application service provider model and applies it to companies' storage needs. The idea is to take data storage, which is widely viewed as a critical but costly and resource-draining IT function, and turn it into just another monthly utility check. Pay the gas bill, pay the electricity bill, pay for storage. When your business grows, you add capacity and cut a larger check.

From the start, Laughran says, TechTarget.com has believed in best-of-breed infrastructure: Sun Microsystems Inc. Web servers, Cisco Systems Inc. networking gear. Storage Networks' offerings fit right in. "They provide an external EMC Symmetrix 3930 disk array," he says. The disk array physically resides at a Boston-area Internet data center operated by Exodus Communications Inc., which is headquartered in Santa Clara, Calif.

For TechTarget.com, another major outsourcing draw was know-how. "Access to expertise was tough," Laughran says. Businesses that build their own SANs must gather IT staffers well-versed in storage and data management; security; availability; and replication.

With today's impossible IT skills shortage (for which there's no end in sight), Laughran thought it made sense to leave the hiring headaches to somebody else.

For bulletproof security and availability, TechTarget.com selected Storage Networks' top-of-the-line service, called SafePACS. The service features remote-site synchronous data replication. Like the vendor's other offerings (DataPACS and BackPACS), it offers redundant connectivity, an operations center staffed around the clock and service-level agreements.

The latter were especially important to Laughran, he says, because they ensured TechTarget.com could retain control over the quality of its site.

TechTarget.com has been more than pleased with its shift to an out-sourced SAN. "The install and upgrade went very easily," Laughran says. "The first install took only three weeks."

TechTarget.com started with 600G bytes of storage and is now up to 1.5T bytes. This easy scalability is one of Laughran's favorite features of the service. Why? "We anticipate doubling our storage capacity each quarter" for the foreseeable future, he says. ▀



**Pat Laughran,**  
Chief Technology Officer,  
TechTarget.com

Ulfelder is a freelance writer in Southboro, Mass. He can be reached at [ulfelder@earthlink.com](mailto:ulfelder@earthlink.com).



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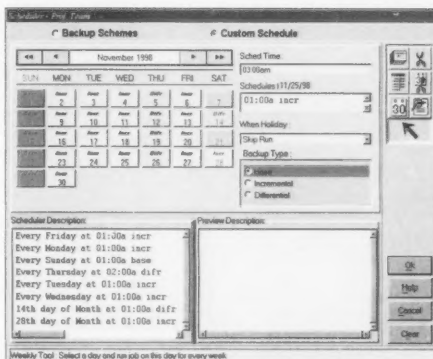
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## Case Study: *EBSCO Publishing* *Wanted 24/7 Storage*

BY STEVE ULFELDER

When EBSCO Publishing went online in 1995, it knew it was making the right move. Even so, the explosion in demand astonished the Ipswich, Mass.-based company. Usage doubled every year, and then some.

EBSCO Publishing, part of the EBSCO Information Services group, is a leading producer of periodical reference databases. The company archives abstracts from more than 5,000 periodicals, as well as the complete text of articles from 3,000 more. Think of it as a one-stop reference shop for schools, libraries and corporate research departments.

With customers in Europe, Japan and Australia, EBSCO faced true 24/7 demand. And its customers are demanding: when they need information, they need it right now. "My job is to make sure our service delivery is on par with or superior to our competitors," says EBSCO CIO Michael Gorrell. "We're like offensive linemen: If we do our job, nobody notices."

EBSCO uses Sun Microsystems Inc. Solaris, a Unix flavor, for its search services and Microsoft Corp. Word running on Windows NT to produce its article abstracts and indexes, Gorrell says. Moreover, the company's databases are proprietary. According to experts, this mixed operating environment makes EBSCO a perfect candidate for network-attached storage (NAS). Because redundancy and availability are critical fac-

tors, the company requires bulletproof infrastructure: It uses multiple T3 lines from different suppliers as well as Cisco Systems Inc. Catalyst switches.

EBSCO experimented with other information delivery methods — in 1995, other network options looked viable — but quickly figured out that the Internet would sweep proprietary and private networks aside.

"In 1997," Gorrell says, "we knew we needed a different way to deliver our services. We have proprietary databases, and we didn't have a way to replicate them. Getting at the content wasn't the problem. It was serving up CPU cycles to do searches." Performance was suffering, and that was unacceptable.

To find the answer, EBSCO "pressed an HP box into service as an NFS server," Gorrell says. NFS, or Network File System, is the de facto standard in Unix environments for sharing files and resources across multiple platforms.

Pleased with NFS, Gorrell soon went shopping for a best-of-breed NFS server.

EBSCO called Auspex Systems Inc. and asked about the Santa Clara, Calif.-based company's 4Front NS2000 Enterprise systems. It was a good move, according to Gorrell, because for EBSCO, a NAS implementation outperformed its SANs option and the NAS was a bit less expensive to implement.

According to a recent report from Framingham, Mass.-based International Data Corp., the NAS market

**"We're like offensive linemen: If we do our job, nobody notices."**

— Michael Gorrell,  
CIO,  
EBSCO Publishing



is exploding. IDC forecasts annual revenue growth of 66%, leading to a \$6.5 billion market by 2003. San Jose, Calif.-based Dataquest Inc. is even more bullish, pegging the 2003 market at \$9.9 billion.

There are plenty of reasons for this projected growth. Over the next several years, IDC predicts, corporate IT staffs will not grow significantly and may in fact shrink — but “the amount of [storage] capacity to manage is increasing by 100% per year.” That sounds familiar to Gorrell. “We started at zero in 1995. Last fall, we were serving 50 million pages a month.”

According to the IDC report, “NAS simplifies the operational side of storage use, reducing IT managers’ hassles by consolidating file-oriented storage to fewer, easier-to-administer appliance servers.”

One clear benefit of NAS is flexibility. Businesses can use NAS servers as primary or secondary storage on a LAN; as shared backup devices for a workgroup; or as backup devices for individual clients. While often slower than dedicated file servers, they’re light-years faster than tape drives — and more than fast enough for most organizations, experts say.

This flexibility appealed to EBSCO. The NFS/NAS combo “lets us add resources where we need them, when we need them,” Gorrell says. Because NAS removes storage access — and the need to manage it

— from the department server, application programming and files needn’t fight over processor resources. This means both can be served faster.

Gorrell also appreciates NAS’s efficiency. “It’s very cost-effective to buy small boxes that just have CPU and RAM,” he says. “With bigger boxes, you can’t get away from buying chassis space” that EBSCO doesn’t need.

Moreover, NAS gives administrators all the functionality of standard server environments, experts say, without the administration overhead. Thus, EBSCO could lessen its dependence on its front-end servers.

With all these benefits, it’s no wonder experts hail NAS as a solid choice for IT managers seeking a scalable, easy-to-implement way to manage heterogeneous file sharing.

Experts say NAS was slow to gain acceptance during the mid-1990s — especially in comparison to storage-area networks (SAN). That’s because many IT departments hesitated to take on new servers from relatively unknown companies.

But as storage companies such as Auspex built their reputations, those worries have vanished. “Our main NFS server has been rock-solid for us,” Gorrell says. “The architecture is solid, the product is solid, the price is very, very competitive.”

Not all NAS products are created equal. Fareed

**N**AS simplifies the operational side of storage use, reducing IT managers’ hassles by consolidating file-oriented storage to fewer, easier-to-administer appliance servers.

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Neema, president of Santa Barbara, Calif.-based research firm Peripheral Concepts Inc., separates NAS systems into three classes. Class 3, the top of the line, includes connectivity to several network topologies; automatic load and path balancing; and high-speed transfers among domains; full diagnostic capabilities; scalability beyond 1T byte; and a host of storage management features, including archiving and library management.

Auspex offers Class 3 NAS systems. That means it's loaded for bear. This year, Auspex deployed a new architecture that promises even more benefits for users. "They went away from proprietary hardware to off-the-shelf hardware," says Gorrell.

Auspex's 4Front NS2000 is the only NAS device specifically designed for file serving that's based on a parallel processing design that uses integrated hardware and software. Called Functional Multiprocessing, this patented architecture distributes different functions among the CPUs in each I/O node. This building-block concept is highly scalable and easy to expand — both features coveted by EBSCO, Gorrell says.

Independent testing has benchmarked 4Front NetServer 2000's performance at 55M bit/sec., 40% faster

than its nearest competitor. NFS throughput for Unix operations benchmarked at 75M bit/sec.

In addition to the server, Auspex's NetService NT software is also a key component of EBSCO's growth strategy. "Auspex's NT gives us seamless file sharing between NFS and NT clients," Gorrell says.

So how has the partnership worked out? Gorrell calls Auspex NAS "a perfect fit" for EBSCO. "Demand for our content is driving our business to a 24/7 model, and Auspex delivers the mission-critical data availability we require." Auspex's 4Front NetServer 2000 clocks in with 99.995% uptime.

Gorrell applauds Auspex's recent move from proprietary to off-the-shelf hardware. "Cost went way down and manufacturability

was increased," Gorrell says. "Now you're buying a well-tested widget."

Today, the majority of EBSCO's revenue comes from its Internet content providing services — and all that data is stored on Auspex servers. "With the Internet blooming like it is," Gorrell says, "NAS is a very good place to be." ■

**“We knew we needed a different way to deliver our services. We have proprietary databases, and we didn't have a way to replicate them. Getting at the content wasn't the problem. It was serving up CPU cycles to do searches.”**

— **Michael Gorrell,**  
CFO,  
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Ulfelder is a freelance writer in Southboro, Mass. He can be reached at [ulfelder@earthlink.com](mailto:ulfelder@earthlink.com).

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## Case Study: *netdrive.com* *Using the Internet for Storage*

Data storage and access is a vital business function at all dot.com companies, but at netdrive.com, it is the business. The company's success in transforming the Internet into a personal storage medium depends on its ability to implement and manage a storage solution that is simple, scalable, reliable and responsive. To meet this challenge, netdrive.com selected NetApp filers from Network Appliance Inc. in Sunnyvale, Calif.

Netdrive.com's free service offers secure personal storage on the Internet — an "Internet hard drive." The storage is as easy to use as a PC's hard drive. Users can store and share documents, photos, music and HTML files and can access the files either from a netdrive.com file system interface or through a standard Web browser. Netdrive.com's service delivers 100M bytes of storage space — the equivalent of 6,000 photographs, 15 hours of MP3 music or thousands of pages of text.

"Our key criteria for a data storage solution were scalability, ease of integration into our existing infrastructure, the convenience of having NFS technology already on the filer and total cost of ownership," says Steve Lewis, chief technology officer and vice president of netdrive.com Inc. "We hope to scale to millions of users, and do it cost-effectively," says Lewis.

To store and reliably deliver its customers' data, netdrive.com deployed two NetApp F760 filers, which can scale from 50G bytes up to multiple terabytes. The filers help the company manage growth by providing

single-copy data sharing among Web servers, which eliminates unnecessary data replication and decreases storage requirements. Netdrive.com can easily scale its service by expanding storage on its NetApp filers via hot-swappable drives and dynamic online disk expansion. It can also easily add new Web servers to the 15 it already has on the front end of its system to handle more traffic.

"That ease of integration is a major selling point. We had the filer up and running in about an hour, and it has eliminated the stability problems we were having. With that bandwidth and the filer now in place, performance improved dramatically," says Lewis.

The NetApp filers give netdrive the capacity it needs to support a rapidly expanding base of simultaneous users with no degradation of access or response times. Innovating with Snapshot Technology, netdrive.com plans to offer a My Backup niche as well, enabling customers to back up the files they've stored on the netdrive.com site. To deliver that capability, netdrive.com has devised an innovative use for Network Appliance's Snapshot technology.

The Snapshot feature of the NetApp filer stores 20 read-only versions of files online — using minimal disk space — so users can easily recover data. For netdrive.com, the total cost of ownership, superior scalability and manageability, and ease of integration made NetApp filers the ideal storage solution for a company whose business is storage. ■



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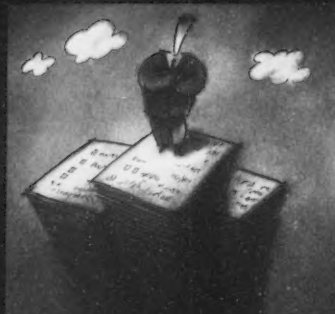
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## Commentary: *Caveat Emptor:* *It's Time for the Market to Integrate*

By Marc Farley



Practically everyone involved with storage networking knows it's a complex technology to implement. This is hardly optimal for anyone, but there's no need to make apologies for it — there are

many talented and hard-working people trying to do the "right thing." There's no doubt that storage network industry participants are trying to solve pressing problems for their customers while also trying to develop industry standards for broad interoperability that will increase the overall market size. Of course, the twin goals of short-term successes and long-term interoperability are difficult to balance. Gradually, interoperability is being achieved, but at a pace slower than desired for many customers.

While Fibre Channel interoperability is certainly in the spotlight, interoperability is an issue for all other companies in the network storage industry to examine. For example, open and standard NDMP backup technology has been around for years, but its implementation in storage appliances and backup software hasn't been consistent. The entire issue of network backup illustrates the time it takes to produce interoperable products. Network backup has been identified as its own industry for more than a decade, but there is still little interoperability among vendors. Hopefully this will change as standards-based data mover and media management technology gains traction in the market.

One of the difficulties in achieving interoperability is

motivation. Vendor companies have fairly clear short-term motivations to increase market share and revenue; in comparison, they have far less pressure to produce short-term interoperability results. Using the backup industry as an example, the market has demanded a lot of individual backup vendors but hasn't demanded much of the industry as a whole. Without a powerful motivating force, vendors have taken the easier and faster approach of working separately, as opposed to working as an industry.

In contrast, the Fibre Channel industry has more visible pressure to make its technology interoperable, but it isn't evident that simply waving the interoperability flag is enough. The cry for interoperability as the end goal is loud and clear, but the market's message regarding priorities for interoperability are far from unified. This isn't so surprising, considering the newness of the technology and the relative lack of storage network skills not only in the market, but also in the industry.

Before storage networking, storage was considered part of a system. System vendors provided compatibility testing for their solutions. Everything worked together because a single vendor made sure it did. Teams of hardware and software engineers worked on a fairly small set of technology that was closely controlled. Over time, a third-party SCSI storage industry developed as storage vendors figured out the operating parameters. Leading companies succeeded in creating the standard implementations that became reference implementations for the industry.

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Without a doubt, open systems market pressures on vendors provided the motivation to support third-party storage products. But make no mistake, system vendors provided a great deal of the interoperability requirements for parallel SCSI. Thus, an entire industry evolved over the years based on the parallel SCSI bus, where one system typically controlled its operations. There was not only a technology pecking order established here, but also a market pecking order, where the systems companies determined the degrees of freedom that storage companies could have.

Since that time, the dynamics of the market and technology have changed drastically. Systems companies no longer have the same type of control in the broad market. This has resulted in somewhat less control or jurisdiction of how storage technology develops. There has been a definite shift from server-centric control to storage-centric and network-centric control.

The notion of enterprise storage, where data is highlighted as the premier data processing resource, is significant because it downplays the importance of systems in the overall strategic IT picture. Companies are beginning to create strategic storage positions in their IT organizations with the responsibility of building long-lasting storage infrastructures. But there isn't a visible vehicle for these important pioneers to gather together and discuss their plans and experiences.

The relative importance of storage products to computer company profits has also changed considerably. When systems revenue dominated storage revenue, it was easy to understand system-centric control of storage. But today, the overall storage opportunity is seen as a more profitable, faster-growing business compared with server systems. As a result, server companies have developed independent storage organizations

charged with selling into all environments, not just for their own server hardware.

The ability to connect many servers to many different storage products on a *network* is a major change that shouldn't be underestimated as many assumptions about storage communications have changed. Prior to SANs, storage designers didn't have to worry about the possibility of multiple hosts trying to send it data concurrently. They didn't have to worry about working in a heterogeneous, multiplatform environment, nor did they have to worry about discovering or maintaining network addresses. Storage products didn't exist in an environment with multiple protocols and their operations didn't have an impact on a large network infrastructure. These are significant issues that will be worked out over time but are still causing interoperability problems for the industry. This work will take time because the industry needs to work out the details together, not under the control of a system company selling a homogeneous solution.

The market requirements and opportunities for storage networking continue to change. This makes it difficult to spend resources on interoperability issues when there are important new fundamental technologies to be created. Realistically, the market should not expect vendors that have discovered a new customer requirement to turn around and make their solution to that requirement an open standard right away.

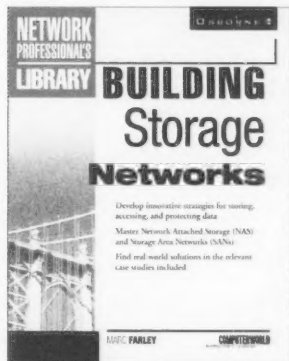
So what of interoperability? Everybody wants it, but how can it be achieved when the technology is expanding so quickly and there isn't a clear, external force driving its adoption? One of the keys is the development of an educated market, including system/network integrators that have the knowledge and ability to get at the core issues. The market needs to understand the





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technology for what it is and formulate the market requirements to the industry. It would be easier if everything about storage networking were neat and tidy and easy to learn, but that isn't the case. Those within the storage networking industry understand various aspects of this technology and may have detailed knowledge of its complexities. But there are very few, if any, who understand the technology in its entirety.

In response, to this need, it is hoped that the Storage Networking Industry Association (SNIA) and other organizations can deliver adequate educational materials for the market. Certainly SNIA's efforts to create working groups for various interoperability efforts are extremely important, but without an educated market to give these groups direction, the overall progress of the industry will be slowed. The education task is difficult and there is a great deal of terrain to cover before a clear high-level view can be achieved. It starts with people who want to learn and will use what they learn to teach others. The industry would do well to listen to the ideas of Brenda Christensen and Paul Massiglia, who have extolled the importance of education in this market since its inception.

SNIA has the potential to bring the industry and the market together. While the industry is well-represented in SNIA, the market side needs building. If that can be achieved, then it should be possible to create a community of customers that can share their ideas and help solve one another's problems. Just as any organization benefits from employing individuals with diverse skills and backgrounds, the community of storage networking users could also benefit significantly from combining their skills and talents.

Building a community might sound difficult, but it is certainly possible. An honest spirit of volunteerism and

open-mindedness is required. Vendors and customers need to avoid product dogma to make real progress and put more skin in the game to provide motivation. Interoperability events, such as "plugfests," have been mostly internal to the industry. Perhaps it's time to open these up to the user community. While some vendors would shy away from this because of potential negative exposures, the external pressure to ensure interoperability could be increased considerably. It would be interesting to see how many vendors would participate in a plugfest if it were run by the user community instead of the industry.

Customers need to step up their involvement by paying attention to the details of interoperability and making their voices heard. They can start by joining SNIA, assuming leadership and demonstrating their commitment to the creation of an open market. There is ample room for their involvement, energy and ideas. Otherwise, we may continue to repeat the discussions of SAN vs. NAS forever without making real progress. And while it might be interesting to digress about the SAN transport of the future over Fibre Channel, Ethernet, IP or Infiniband, these discussions won't help create workable solutions today.

There are too many underlying storage technologies to understand first. ■

---

Farley began working with network storage technology in 1991 and has held both marketing and business development roles in the industry ever since. He is vice president of marketing at SanCastle Technologies, a designer and builder of Gigabit networking switching fabrics. Farley is author of *Building Storage Networks* (Osborne McGraw-Hill) and numerous white papers and magazine articles on storage I/O technology.

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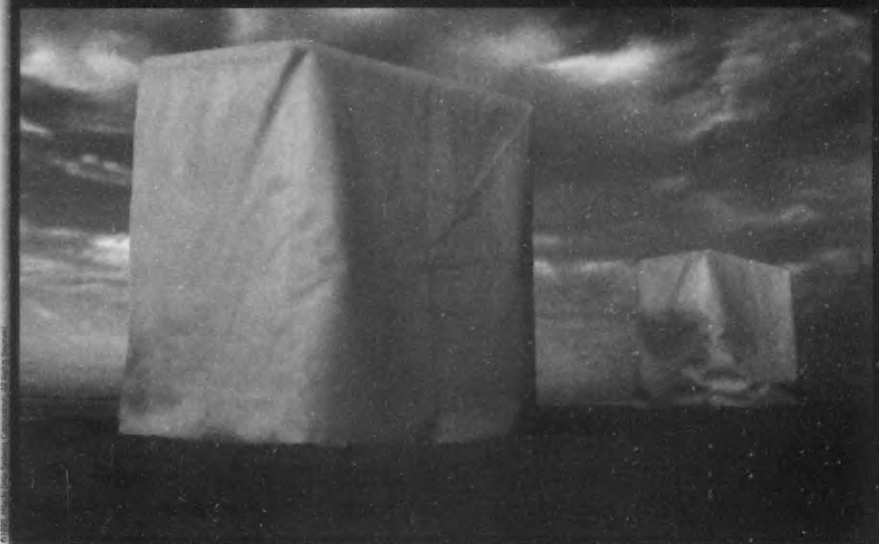


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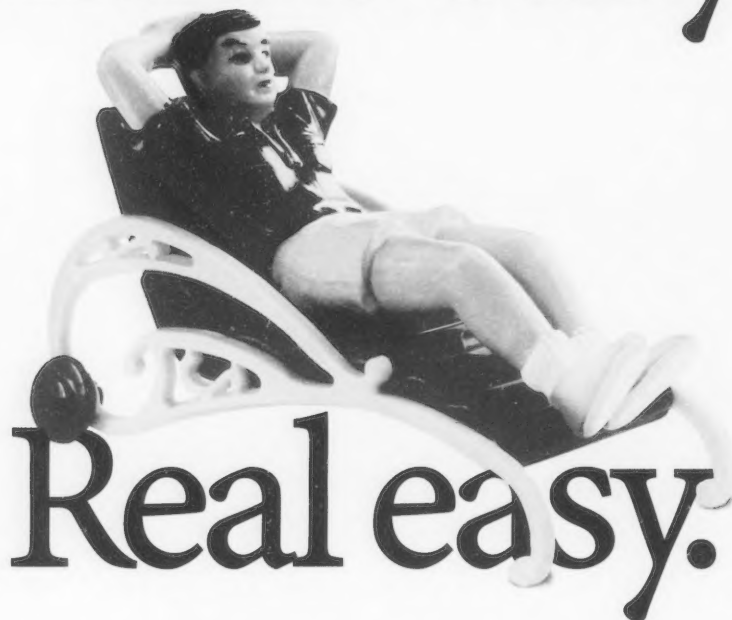
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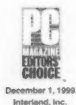
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The push is on for health care companies to integrate the Web into their IT plans, but doctors aren't buying into the hype, according to a recent Forrester Research report. Doctors don't trust the Web, the survey finds, and their resistance is slowing the medical industry's e-commerce growth. **▶ 40**

## IT TO THE RESCUE

Corporate leaders know they must move forward with e-commerce plans, but they just don't know what to do, according to a new study. The dilemma leaves the door open for IT professionals to educate executives and take charge of e-commerce projects, writes Kevin Fogarty. **▶ 42**

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*Established businesses, management slow to adapt to online requirements*

BY KATHLEEN MELYMUKA

**D**ESPITE ALL the sound and fury that's surrounding e-commerce, key managers in most large companies are still unclear about e-commerce strategy, and their people lack e-commerce skills. And e-commerce is causing a lot of upheaval in organizations, but so far few seem to have developed a blueprint for how to handle it. Those are among the findings of a recent survey of more than 300 major companies conducted by New York-based global management consultancy Towers Perrin.

Of particular concern is the shortage of "e-literate" people in the workforce. Nearly nine out of 10 respondents said not enough of their key managers have e-commerce skills and insights.

"There's a big reliance on the latest technology buzzwords, without understanding what they are or the ramifications to the company," an e-commerce manager at a major retailer explained. "Management above the worker-bee level doesn't understand."

The survey also found that even when people possess several years' experience, that doesn't guarantee that they "get it." Companies with more

than two years of e-commerce under their belts indicate that their chief concern is still that too few key managers have Internet skills or insights.

Sixty-six percent of respondents said they are struggling to attract people wanting to take advantage of online opportunities. "There's not a lot of experience out there," said Mike Coleson, an applications manager at Educational Credit Management Corp. in St. Paul, Minn.

The survey also revealed that traditional organizational structures and cultures tend to inhibit progress in e-commerce. Nearly three-quarters

of respondents acknowledged that their organizational structure slows decision-making. "We have several layers of management that you have to get through," explained the e-commerce project manager. "And depending on the knowledge or interest level as you go up through the chain, things can get stymied."

More than half of those surveyed said their culture is a barrier to getting things done. "People are very protective of their area," said an e-commerce manager at a major manufacturer. "When you're changing the way you do business, they feel very threatened."

Although the need for change in organizational and management structures is understood, not much has taken

place so far (see chart below). But the degree of change anticipated over the next two years indicates how seriously corporate management views e-commerce issues. "We're looking at organizational changes," the manufacturing manager said. "We're aligned along product lines, but e-commerce covers everything, so you have to figure out how to reorganize to take care of that."

Change isn't easy, but the stakes are clear, she said. "Our success is going to depend on how quickly the company can effect these kinds of changes."

E-commerce also promises to shake up business processes. Less than 20% report that e-commerce concerns have forced significant changes to processes such as advertising, market research, supply-chain management, account management, customer tracking and after-sales support. But more than half anticipate such changes in each area within two years.

"We'll be re-evaluating our old batch-processing environments and moving toward real time, where we process data as we receive it," the retailer said. "We're going to see process changes associated with having to do more business-to-business over the Internet as opposed to EDI [electronic data interchange], and we'll be offering processes in multimedia: traditional and EDI for our large trading partners, and alternatives on the extranet for others."

There is no clear home for

## Who's in Charge?

*There's no single department that says it consistently owns e-commerce efforts*

IT	17%+
Marketing	16%+
Multiple operations	14%+
Subsidiary/product line president	13%+
Sales/business development	13%-
Operations	9%-
Independent business unit	9%+
Other	7%+
Main business	3%+

Note: Arrows indicate forecast of future accountability; line indicates no change

e-commerce in the corporate structure. Currently, information technology is leading marketing by a hair, but there's no commonly accepted understanding of who should "own" it (see chart above). "We are extremely fragmented," the retailer reported. "We have the business-to-business extranet owned by one group, a public Internet site owned by another. A new business-to-consumer effort will be managed by a third group. It's really out of control."

Most companies are playing e-commerce close to the vest, with 90% or more of those surveyed maintaining internal control of customer service, customer data management, ordering, payment and fulfillment. The only exception is technology, where 44% have outsourced Web site development and 45% have outsourced software development and systems integration. ■

## Management Processes

*Percentage of respondents who have adopted or who expect to adapt their organizational and management structures to e-commerce:*



## Finance Players Back XML-Based Standard

*Consortium to push report specification*

BY MARIA TROMBLY

Many of the world's top financial institutions have formed a consortium to promote a new XML-based specification for exchanging financial reports over the Internet.

The group, the XBRL Proj-

ect Committee, expects to launch the specification by July 1, the American Institute of Certified Public Accountants, the group's founder, announced last week.

The new specification was designed to simplify the exchange of financial data by introducing a universal system of XML tags that will identify the function of each piece of financial data. Currently, several dif-

ferent — and incompatible — formats are used to publish this data.

The specification's creators say that this will eliminate the need to retype data that is already available and will make it easier for organizations to handle complicated financial information.

The specification — Extensible Business Reporting Language (XBRL) — is also backed

by top financial service companies such as Standard & Poor's, Arthur Andersen LLP, Deloitte & Touche LLP, Morgan Stanley Dean Witter & Co., Ernst & Young LLP and PricewaterhouseCoopers.

The initial release in July will cover specifications for publishing a company's financial statements in XBRL, said Mike Willis, a partner at New York-based accounting firm PricewaterhouseCoopers and chairman of the XBRL Project Committee.

Willis said XBRL won't be

used for individual transactions, but for high-level aggregate data, such as that included in quarterly sales reports, for example.

XBRL will ultimately affect any company that processes financial reports or uses them online, according to a statement by Keith Macbeath, director of strategic planning at financial information publisher Reuters Group PLC in London. Reuters is considering using XBRL to help it acquire, process and deliver financial data.

XML Standard, page 40

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# Report Says Doctors Hate Internet; Doctors Disagree

*Forrester report is at odds with AMA's findings*

BY CHRISTINE MCGEEVER

**A** NEW REPORT claims that doctors are wary of the Internet and that plans by health care executives to integrate the Web into their information technology plans will remain a long shot until their discomfort is eased.

The report from Cambridge, Mass.-based Forrester Research Inc., titled "Why Doctors Hate the Net," asserts that the success of health care executives' business plans depends on doctors being online but that doctors don't put much faith in the Internet's usefulness right now. So "the Net looms as a

major obstacle," the report states.

The study, based on 60 interviews with U.S. and Canadian doctors and health care executives, found that doctors have many complaints about the Internet. They said they don't want to e-mail patients without being paid, they don't trust the quality of medical information on the Web and they're concerned about the security of sensitive records being transferred online.

But Richard Corlin, speaker of the House of Delegates at the American Medical Association (AMA) in Chicago and a gastroenterologist in Santa Monica, Calif., disagreed with the findings.

Corlin said AMA studies show that

80% of physicians are using computers and that technology use within the medical profession is basically the same as it is in other walks of life.

Analyst Michael Barrett, the author of the Forrester report, said doctors have a distrust of high-tech systems.

"Doctors have been burned before by technology," said Barrett, referring to a previous generation of LANs and electronic data interchange relationships with health maintenance organizations. While doctors sped up their billing practices, he said, insurers didn't cut down on the turnaround time for payments, because they were holding on to the money until it could be invested.

But Barrett said doctors may see on-line automated billing in a positive light because electronic claims are accurate and don't require extensive review and "cleaning" after submission.

The report also cites two technologies, voice recognition and personal digital assistants (PDA), as attractive but not yet ready for prime time.

"Wireless might be the thing that gets them to buy in," Barrett said.

The downside is that too many PDA choices exist, and a shakeout must occur so that physicians don't have to negotiate clutter, he said. The report calls on the AMA to push for PDA and wireless standards.

Though the quality of medical content on the Web has been questioned, Corlin said the tide seems to be turning.

He cited the financial troubles of the once-successful DrKoop.com as evidence of a shift in demand from commercial, entertainment-oriented information to more substantial content. The information on DrKoop.com is available for free and supported by advertising, which makes it suspect to many doctors, according to Corlin.

Jay Thorwaldson, a spokesman for the Palo Alto Medical Foundation (PAMF) in California, said doctor resistance is the result of "inertia of how you do things."

Physicians at PAMF have been forging ahead on the Internet, perhaps as a result of the influence of their patients.

PAMF is in the process of developing fully integrated "virtual clinic" Web sites where patients can set appointments, provide condition updates, review test results, request prescription refills and receive bulletins and advisories from doctors.

"It allows us to integrate and extend the facility," Thorwaldson said. ▀

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DOCTORS AT THE PALO ALTO MEDICAL FOUNDATION are forging ahead on the Web, possibly because of the influence of their high-tech patients

Continued from page 38

## XML Standard

The new specification was designed to be compliant with generally accepted accounting principles, said David Ulrichs, an accounting research manager at Deloitte & Touche.

Other specifications, which will cover regulatory reports, tax filings and other business event reports, will be issued within the next 18 to 24 months.

"We will be producing a large matrix of electronic dictionaries with different

taxonomies for each geography and industry," Willis said.

"We have vendors such as SAP who are already working to integrate XBRL directly into their software, so when their customers want to run their financial statements, XBRL is an option," said Christy Reichhelm, an enterprise resource planning industry manager at Microsoft Corp. who is also a co-chair of the public relations and communications working group for the XBRL Project Committee.

The specification will be a free download that is relatively easy to plug into existing software, Willis said. ▀



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KEVIN FOGARTY/BRICKS AND CLICKS

## Muddling through to a disaster

**I**N BRAZIL THREE WEEKS AGO, 2,000 angry commuters set fire to a train after it broke down on the outskirts of Sao Paulo. I'm guessing it wasn't the first time that train was late.

If you've ever commuted in a big city, you've probably felt the same way. Under pressure, late, needing to get to work and to get things done. And the mechanism you rely on to get you to the job safely and on time just isn't making it. It's infuriating, whether it's the people, the infrastructure, the organization — something has stopped you dead in your tracks.

In the U.S., stalled e-commerce projects are causing a slower burn.

Management consulting firm Towers Perrin just released a study of more than 300 companies that showed that most just don't know how to make effective e-commerce projects happen (see story, page 38).

Survey respondents told Towers Perrin that they had some of the answers to vexing e-commerce problems but that their organizations were too fragmented to put them together.

A study The National Association of Manufactur-

ers did of its 14,000 members found that 70% aren't launching e-commerce projects because of the cost and complexity involved. This in an industry that has years of evidence showing how much supply-chain automation can cut costs and improve customer service.

And what is business-to-business e-commerce but supply-chain management using XML instead of EDI?

Other non-e-commerce-using manufacturers recently told *Computerworld* that they're worried that trading online will force them to bargain more with customers or, God forbid, bid for business at auctions.

Duh. That's what the Web is

for: to put you nose-to-nose with your business partners. And if you don't get there, someone else will.

Stewart McCutcheon, di-

rector of e-commerce technology at Du Pont, put it bluntly in a recent *Computerworld* interview: "Somebody will step between you and your customer and [eventually] turn you into a commodity-based supplier."

That's where you come in. Or at least, it better be. Technology is what unites any e-commerce plan. That gives you — the technology people — the opportunity to play deal maker.

Identify key managers and executives and educate them.

Don't sell them an IT project; make them knowledgeable enough to let them decide to move forward.

Identify win-win ap-

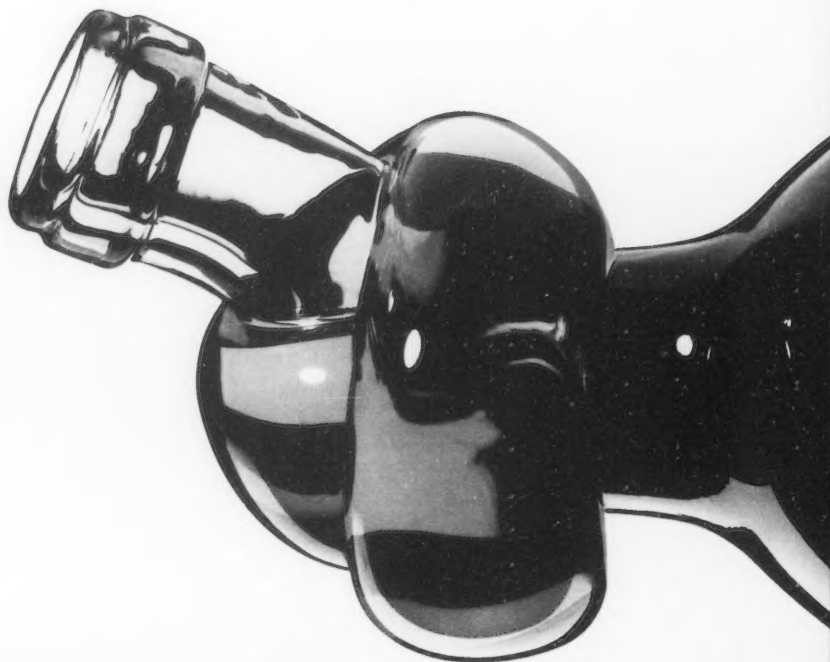
proaches. Internal politics can be nasty, but if you can show all your key players how they will either benefit directly or look good by cooperating, they're less likely to hold things up.

Become the driver of your firm's e-commerce projects. Someone has to do it.

If you don't get these projects back on track, the whole company may end up on the outskirts of dot-comville, frozen in place, smelling smoke. ■



KEVIN FOGARTY is *Computerworld's* business editor. Contact him at [kevin.fogarty@computerworld.com](mailto:kevin.fogarty@computerworld.com).



Here's to a faster Web site: the Compaq TaskSmart C-Series server.

## Techies Make Screen Debut in National Dot-Com Ads

### Ads make 'geeks' instant stars

Life is full of surprises. One day, you're operating your company's network or developing its Web site. Next thing you know, you're talking about your geeky career before millions of Americans on national TV.

Career resource Techies.com Inc. in Edina, Minn., picked six real-life information technology professionals to appear in its national advertising campaign — for television, print, online and radio — that launched nationally April 10.

Two of the lucky chosen, **Kate Jelinek**, vice president of MIS at New York-based Global Strategies Group, and **Daniel Samber**, a software engineer at

The Mount Sinai Medical Center in New York, told *Computerworld's* Julekha Dash about their time in the limelight.

**Q: How were you selected to be in the Techies.com commercials?**

**JELINEK:** I simply hit Reply [to the e-mail] and attached a digital photo from my [company's] Web site. I made it to the second round. They threw a cou-



**SAMBER** says he's now MTV-cool

ple of questions at me on what it's like to be a woman in the industry. It's a topic dear to my heart, so I enjoy talking about it. It happened without my even thinking about it. Next thing I knew, I was chosen [for] the advertisement.

**Q: What was it like shooting the commercial?**

**SAMBER:** I went down for a screen test — someplace in the West 20s in Manhattan — and I open the door, and I figured I'd see a lot of geeks. And there are dozens of beautiful women, and even the men were gorgeous — leather pants, exposed navels, a woman in the corner stripped to her bra. But they were shooting two other commercials — one for Lipton tea and one for Bell Atlantic, I think. But eventually I found

the door for the Techies.com commercial. So I wait in line and tried flirting with some of the women there. I was on my way to Linux Expo. None of the models had heard of Linux.

**Q: How have your friends and co-workers reacted to the ads?**

**JELINEK:** People come up to me and say, "I saw you three times this weekend." Apparently, it's been played on a lot of prime-time shows. My family is a little blown away.

**SAMBER:** I have friends who try to be actors full time and know what it's really like. Now they're all jealous of me. They're handing me head shots, [saying], "See what you can do." They think that I have an in. No, I answered an e-mail. But who knows? Maybe I'll be discovered — unlikely.



**JELINEK** talked about women in IT

**Q: What do you think of the way techies are currently represented in the media?**

**JELINEK:** Being a woman in the industry, I don't know any woman who does what I do. It's good that they had at least one woman in the commercial.

**SAMBER:** In 1990, when I was sending e-mail, I was a geek, and now I'm MTV-cool. [IT people] aren't going to be featured making out with Sandra Bullock in a movie, but [their image] has been getting better over the years. ▀

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## WORKSTYLES

### What It's Like to Work at . . . Epicentric Inc.

**Interviewee:** Brian Scott, director of information technology  
**Company:** Epicentric Inc.

(www.epicentric.com), a provider of packaged Web portal and infrastructure software. It also offers hosting and content management services

**Main location:** San Francisco, in the SoMa (South of Market) district

**Number of IT employees:** 12  
**Number of employees (end users):** 120 (an increase from 30 to 40 four months ago)

**Dress code:** Casual

**Workday:** 12-hour days, usually starting between 9 and 10 a.m.  
**IT growth this year:** "We'll more than double."

**On-site amenities:** A dedicated concierge for the engineering staff "who does all the things they aren't able to do because they're working 12- to 16-

hour days," including getting lunch and dinner, paying bills, dropping off and picking up dry cleaning. "Last week I had a flat tire, and she fixed it." Other amenities include yoga classes, massages, free lunches and dinners and three refrigerators fully stocked with snacks, fruits, vegetables, candy and sodas.

**How does the IT staff make time to benefit from yoga classes and massages?**

"Everybody needs to take a break. I don't expect anyone to stare at their computer screen for hours on end."

**How many IT people show up for the yoga classes?**  
(Laughs) "I think one or two come in for those."

**Other perks:** Full health care plan, stock options, subsidized membership at a local gym, monthly birthday parties and movie nights on Thursdays.

"We take a weekly poll and get a DVD movie and bring pizza in. Last week we watched *The Matrix*. What else would you watch at a software company?"

**How much impact have the perks made on hiring and retention?** "I've had no problems retaining any staff. The company is about 2 years old, and I haven't had anyone leave voluntarily."

**How do you justify the budget for these perks?** "Find-

ing quality people in this market is not easy, so I just have to look at . . . our 100% retention."

**Compensation:** "We have to be competitive with both salaries and stock options. All employees get options."

**Bonuses?** Employees get various referral bonuses.

**Employee reviews:** Annually

**Major IT initiatives:** "We're planning to move to a larger space, so [we're] transferring our IT infrastructure. And we have many plans for [enterprise resource planning]-type initiatives that would work down the middle of our internal and external operations."

**Kind of offices:** A mix of cubicles and open space on one

floor in a refurbished factory. "Most of the engineering team is in a cubed environment because they need privacy to focus

on a project. Those who are more collaborative, like marketing and sales, are in a more open environment."

**Decor:** Exposed pipes and cables and carpeted floor.

"There are some paintings in the kitchen and around the office, but I barely have time to look at them. We have lots of big windows with a great view of the Bay Bridge and the San Francisco Bay."

**Must people carry beepers?**

**Cell phones?** Yes. "Most of the IT staff carries a beeper, but only very rarely do you get called back to the office after hours. Maybe you get beeped once a week. We provide [digital subscriber line] service in all [of our employees'] homes so they can work remotely, and we have [virtual private network] and dial-up access for other users."

**Where does the office gossip?:** "Around the nearest computer."

**Would employees feel comfortable e-mailing the CEO?** "Yes. We have an open-door policy."

**Quote:** "I come from a very corporate background, and that is a very different pace. The fast pace here is the big difference—being able to move ahead on the things you want to do."

—Leslie Goff

ED YOURDON

## Finding bottlenecks

**A**T A RECENT corporate IT meeting, I heard an interesting observation from a group of managers looking for ways to reduce their projects' time to market. They said the biggest bottleneck in their development process wasn't the usual activities of analysis, design, coding or testing. Instead, it involved delays in approving contracts

for relationships with vendors, subcontractors and strategic partners.

Once such a bottleneck is recognized and acknowledged, there are several obvious ways of addressing it, such as standardized contract templates or preapproved contractual relationships with a few vendors. But if everyone is focusing their process-improvement energy on other aspects of the systems development process, the problem may never be solved.

At first glance, it sounds like the solution is to develop a thorough, detailed model of the systems development process, then improve it. Or perhaps launch a full-scale re-engineering of business processes, in which we follow manage-

ment guru Michael Hammer's advice to "obliterate, not automate" the existing process and replace it with something radically better. This is probably good advice for 90% of IT organizations that are still languishing at Levels 1 or 2 on the Software Engineering Institute's process maturity scale, which means that they have either no process or an unwritten one.

But beyond that, there's a more subtle problem. Most models of software development processes that I've seen are static models. That is, they may be very detailed and sophisticated, but all they describe are the input, process and function aspects of each step. They lack information about the dynamics of the process, such as the time delay between one activity and the next or the possibility of feedback loops to a previous activity.

The time delay may even be formally acknowledged as a factor, but it's nevertheless a reality in a project's day-to-day life. For example, the functional specification (one step) has been finished, and the manager's approval (the next step) is a rubber-stamp formality. However, the manager is on a three-week vacation, and, as a result, everything grinds to a halt until he returns.

And the presence of feedback loops may be

acknowledged within the formal process model, but it often has such an innocuous form that nobody realizes that, in the worst case, it can degenerate into an infinite loop. For example, approval activity could acknowledge the possibility that a responsible manager might find some problems and mistakes in the functional specification and send it back to systems analysts for review and correction. Suppose, in the worst case, that the manager has been replaced by the time the revised specification is sent for approval. The new manager has a different opinion than his predecessor about the details of the specification, so he rejects it again and sends it back for another iteration.

Since cycle time is such a crucial aspect of systems development, all this suggests that the process model should be a "system dynamics" model that takes into account time delays and feedback loops. There are numerous inexpensive, easy-to-use tools available for building such models; the insights they provide in many development organizations is profound. Among other things, they often demonstrate that a ten-fold improvement in coding productivity will have negligible impact on the overall development schedule for a project, but a cumbersome bureaucratic review process can have a disastrous effect on the project team's ability to finish its work on schedule.

Bottom line: If you're interested in process improvement — especially in today's world of "Internet time" and rapid prototyping to speed up systems development — a key thing you should consider after you've documented and implemented a "reasonable" process is to simulate its dynamic

performance, so that you can find bottlenecks before it's too late. ■

Yourdon is editor of Cutter IT Journal, published by Cutter Consortium in Arlington, Mass. Contact him at [www.yourdon.com](http://www.yourdon.com).

App development models should include potential bottlenecks.





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eBusiness Software That Can Think.

# LITTLE E-ENGINES THAT COULD

E-commerce isn't just for the big players. Smaller companies are finding creative ways to overcome the hurdles the big guys pay big bucks to avoid. By Kim S. Nash

**A**S WITH OTHER small and midsize companies, year 2000 fixes forced Agricredit Acceptance Co., a small financial services firm in Des

Moines, Iowa, to postpone e-commerce plans last year. But no longer. Agricredit plans to offer some basic transaction processing on the Internet this summer.

Still, the company wasn't sidelined out of cyberspace while it worked on Y2k problems. It gained a Web presence in two ways. First, Agricredit hung a link off the Web site of its much larger parent company in the Netherlands, De Lage Landen ([www.delagelanden.com](http://www.delagelanden.com)). Then it worked a deal to share space on the site of Agco Corp. in Duluth, Ga., which makes the heavy agricultural equipment that Agricredit finances.

Agricredit and other companies with less than \$1 million in annual sales face special pressures when contemplating

the online marketplace. They must compete with the powerhouse Fortune 1,000 but can't afford to spend as freely. Their Internet undertakings, therefore, must be focused and fiscally tight.

Large companies "might spend \$100 million on something, and it's not even an asterisk on [an] income statement. We lose a hundred mil, and I get to go look for a new job," says Bruce Cheek, an information technology manager at Agricredit.

That's why help from the parent company is invaluable. For example, for Agricredit's new e-commerce venture — an instant online loan-evaluation site — De Lage Landen is providing 12 developers to Agricredit's two, Cheek says.

The new Web site should cut loan-processing time by days and, in some cases, weeks. That's expected to save Agricredit money, though Cheek declined to say how much.

Prototypes are due in June, and go-live day is scheduled for Aug. 1, he says. "It's nice to go forward. Y2k was such a pain

in the you-know-what. It was just a survival mechanism. It didn't add to the bottom line," he says.

With limited funds and constraints on both staff and time, midsize firms must be as resourceful as Martha Stewart — but still cautious, analysts say.

One option is to use a middleman marketplace, such as Amazon.com Inc.'s zShops or Yahoo Inc.'s Shopping.

At zShops, specialty retailers can offer individual items for sale, paying Amazon.com a fee for each listing based on the selling price. Seattle-based Amazon.com is the top shopping site on the Web, with 14.7 million unique visitors during January, according to Media Metrix Inc., a market research firm in New York.

Certainly, Santa Clara, Calif.-based Yahoo is popular, too, with its properties visited by a total of 44.3 million people in January, according to Media Metrix.

But there are two potential problems with big marketplaces, says David Yockelson, an analyst at Meta Group Inc. in Stamford, Conn.



“

**[Large companies] might spend \$100 million on something, and it's not even an asterisk on [an] income statement. We lose a hundred mil, and I get to go look for a new job.**

BRUCE CHEEK, IT MANAGER,  
AGRICREDIT ACCEPTANCE CO.

First, a midsize firm risks being “a faceless company,” Yockelson says. “You want to choose a marketplace that’s established and will be around a while, [but] not just an e-classifieds, not just a list-maker.”

The other glitch, conversely, might be too much popularity: Smaller retailers risk being unprepared for an onslaught of traffic, he says.

### Balance Is Good

Midsize firms might instead want to look for partners that offer help with branding that’s tailored to your own goals, Yockelson advises.

For example, a public auction-style e-commerce site wouldn’t be a good fit for a company that doesn’t want to reveal its pricing strategy, he says. In that case, try a secured extranet that only preapproved users can access.

When time, not money, is the issue, some companies are able to buy an instant e-commerce presence.

That’s what Petco Animal Supplies

Inc. did last July, when it invested at least \$30 million for a 26% stake in San Francisco-based Petopia.com Inc.

San Diego-based Petco’s site is information-only; users can’t buy anything there. But rival pet companies, including PetsMart.com Inc. in Pasadena, Calif., have beaten Petco to online commerce by several months.

The pressure is on.

Petopia.com has sold pet supplies online since August but is \$41 million in the red. Neither Petco nor Petopia.com would comment for this report. They cited a quiet period as Petopia awaits approval for an initial public offering request, filed March 10.

But Securities and Exchange Commission (SEC) documents reveal a complicated, exclusive partnership.

Petco agreed not to partner with other pet-related e-commerce sites. Petco plans to install Internet terminals in its 500 stores, linked directly to Petopia.com. It also agreed to give Petopia.com access to its customer database, which

details buying habits and personal information, such as kinds of animals owned, for millions of frequent Petco shoppers, SEC documents say.

In return, Petopia.com users are directed to Petco’s physical stores for more merchandise and services, and Petco got two seats on Petopia’s nine-member board of directors.

Some of the best bricks-and-clicks partnerships occur when the bricks side of the equation stops thinking of Internet start-ups as competition, says Walid Mougayar, president of Cyber-Management Inc., an Internet consulting firm in Toronto.

Instead, they should form partnerships selectively with existing online companies to build up customers in areas that physical stores don’t reach, he advises. “You have to be bold and partner even with those companies that you fear,” Mougayar says.

Elsewhere, so-called Web hosts abound. These companies will rent space for Web sites and sometimes

## E-Commerce for Nongiants

*Companies that lack the resources of giants like The Walt Disney Co. or Procter & Gamble Co. must be clever in their e-commerce strategy. Here are some tips:*

■ **Go lean.** No one wants to cut corners, especially in the public online realm, where everyone can see your mistakes. But carefully consider every dollar you’re poised to spend on e-commerce projects. “There’s no shortage of cyberexperts ready to take your money away,” notes Walid Mougayar, president of Cyber-Management Inc.

■ **Depend on a parent.** If you’re part of a larger company, lobby the central office for funding for your project or enlist appropriate business units to contribute.

■ **Approach a trade association.** Industry groups often reserve space at their Web sites for members to post information about themselves. You’ll at least get some online exposure that way.

■ **Think targeted.** Rather than trying to partner with a giant like Yahoo, where a midsize company can get lost, find a smaller player. Even better, look for a smaller partner that’s well-established online but has a customer base not yet penetrated by your physical company. Brick-and-mortar companies should “find a ‘clicks’ partner focused on a particular vertical that they don’t have,” Mougayar advises.

provide help in creating the site. For example, Advanced Internet Technologies Inc., a 4-year-old Web host in Fayetteville, N.C., charges \$8 to \$360 or more per month; domain-name registration is \$26.50.

One caveat: Find out whether you’ll have your own server or if you’ll be sharing space with other companies. If you’re sharing, get the host to sign a service-level agreement that guarantees your site will be available even if the server crashes due to problems with others on the same box.

### Consultant Comfort

Small and midsize companies must “be absolutely comfortable” with any outside consultants they use, warns Leslie Shattuck, an analyst at Cahners In-Stat Group in Scottsdale, Ariz.

These users “need to take baby steps when starting to use the Internet,” she says. “They don’t have a lot of money to waste.”

But it can be tough to find trustworthy help when so-called Internet consultants come and go like gophers on a golf course. One tip: Check out The Web Host Guild, ([www.whg.org](http://www.whg.org)) a 2-year-old nonprofit group in Pompano Beach, Fla., that certifies Web hosts as honest and legitimate.

Shattuck suggests that users look at services offered by reputable Internet service providers, such as the UUnet Technologies Inc. division of MCI WorldCom Inc. She also recommends looking into telephone companies. AT&T Corp., for example, offers site development and hosting tailored to smaller businesses.

“At least there’s a name behind the service,” she says. ■



**T**HE INTERNET IS FORCING Charles Garner to become more savvy about the law at Lesco Restorations Inc., a property management company in Spartanburg, S.C., where he's director of information technology and telecommunications. Since every employee got Internet access about a year ago, new legal issues have come up — so much so that the company's employee handbook has been changed to include IT concerns.

As technologies change, so do the legal issues that go with them. And that's requiring IT managers like Garner to keep up-to-date with the law as well as technology.

Lesco's handbook, which employees must sign off on when hired, gives causes for termination that include such IT infractions as downloading potentially embarrassing information (such as pornography) from the Internet, e-mailing company documentation without authorization to people outside the company and getting involved with electronic chain letters.

These weren't issues Garner needed to concern himself with until recently, because employees weren't on the Internet. He didn't wait for these issues to become problems; with help from outside legal counsel, he drew up the rules before problems came up. He says he figured he was vulnerable to Internet problems based on what he read in trade publications and heard discussed at various trade group meetings.

#### Copyright Concerns

Garner also now copyrights all internally developed software. Until the Internet became ubiquitous, he didn't have to worry much about software theft, because customers and others couldn't access it. But now he says he worries, "If an application is out on the Internet, we can't control who sees it."

E-commerce is also causing legal ripples for Thomas J. Murray, vice president of information services at J. C. Whitney Inc., a Chicago-based vendor that sells auto parts to consumers via mail-order catalogs and the Internet. "We have a Web site selling directly to consumers, and we're very concerned about [state sales] taxes on Internet sales, because sales tax rules vary among states and it's tough making sure one adheres to each state's law," he says.

Nevin Anderson, an IT manager at Mity-Lite Inc. in Orem, Utah, says hiring and firing remain legal hot spots. "Any time we separate an employee, we make sure it's done for the right reasons," he says. When firing, he also pays particular attention to severing the separated employee's access to infrastructure like file servers and e-mail. A couple years ago, the manufacturer of institutional tables and chairs added a section to its employee handbook on the use of computers and telephones. It covers the proper use of e-mail and the Internet and the fact that employees give up their right to privacy when they use company computers.

Newspaper headlines are filled with news on mergers and acquisitions, leading Lauris Nance to think proactively on some of her contracts with IT vendors. Nance, CIO at Public Service Company of North Carolina Inc., a natural gas utility in Gastonia, N.C., says she knew her company might make an acquisition or be acquired. That's why she made sure her contracts had the flexibility to allow software ownership rights to pass to a new owner, for example, or to cancel or change a contract when the two merging parties shared some of the same vendors. Good thing, too, since her company is now being acquired.



**CHARLES GARNER**  
at Lesco Restorations  
has seen new legal  
concerns since every  
employee at his  
company got on the  
Internet last year.

# Keeping Up With The Law

As if technological change weren't enough, IT leaders must also keep abreast of new and different legal issues that come with that change. Here's how they keep up.  
By Alan S. Horowitz

## In-House or Outside Counsel?

Should you use in-house legal counsel or rely on outside help? IT managers suggest it's a matter of personal preference.

**Alliant Foodservice Inc.**, a Deerfield, Ill.-based food distributor, has two in-house attorneys who work on technology issues, says Barbara Moss, senior vice president and CIO. "I'm dependent on them. I talk to them once or twice a week," she notes.

**Public Service Company of North Carolina Inc.** uses in-house counsel but has no technology specialist, says CIO Lauris Nance.

**Lesco Restorations Inc.** is too small to have its own in-house counsel, says Charles Garner, director of IT and telecommunications, so he relies on a firm that specializes in business law.

— Alan S. Horowitz

"With so many companies being involved with mergers, I would think CIOs would want to review their contracts," says Nance.

The fast pace of technological change is also driving the need for flexibility in contracts, says Paul Arne, a partner at the Atlanta law firm Morris, Manning & Martin LLP. That's because technology, especially the Internet, is creating relationships between companies that have never existed. He has a for-profit client that's trying to attract volunteers for certain activities through Web sites and portals. The relationships between Internet companies "is something my client has never had to consider before," says Arne.

Another new potential problem area is giving software providers the right to cancel a license with a 30-day notice, even with mission-critical software. Who had mission-critical software a decade ago? "It puts the company in a situation where the software provider can hold the company hostage," warns Arne. If the software is critical, make sure the contract adequately protects you.

## Outsourcing Contracts

Contracts become particularly critical when the IT department outsources some or all of its functions. Gail Peterson, vice president of technology and support at ChoicePoint Inc. in Alpharetta, Ga., says that for an outsourcing contract, it's vital to define intellectual property rights, technology refresh provisions, service-level agreements and other business-oriented aspects. ChoicePoint provides decision-making information to the insurance industry.

Although many CIOs rely on in-house attorneys or outside counsel to keep up-to-date on IT-related legal developments, some IT managers also work to keep current. Peterson has attended IT legal conferences sponsored by major computer industry research firms, while Garner relies on articles in trade journals and Murray belongs to the Chicago Research and Planning Board, which has held meetings related to legal issues.

Legal issues may not be as compelling as technological ones to IT professionals, but the landscape is shifting quickly enough that no IT manager can ignore what's happening with the law. ■

Horowitz is a freelance writer in Salt Lake City. Contact him at [alan@ahorowitz.com](mailto:alan@ahorowitz.com).



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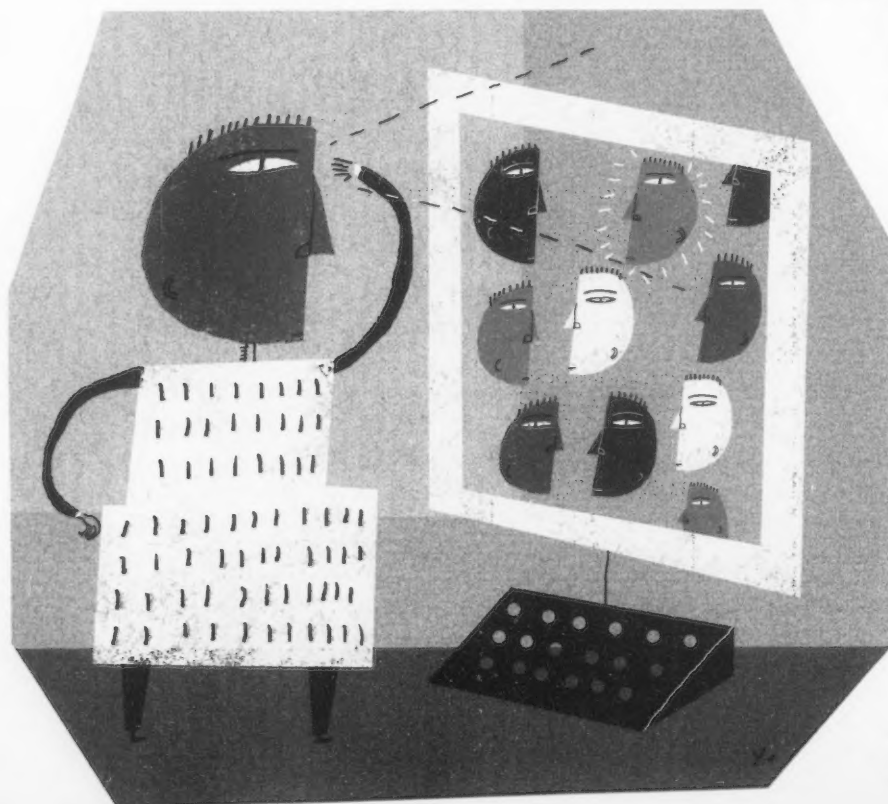
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# The Passive/Aggressive JOB SEEKER

Recruiters are desperate for the IT pros who are working, not looking. But there are ways to make sure you get discovered as a non-job-hunter. By Dawne Shand



**P**ASSIVE JOB CANDIDATES — those who aren't looking for something new but would receptively listen to a great offer — remain the most highly prized catch by recruiters.

The techno-savvy recruiters navigate the Internet maze looking for these people, who represent a proverbial pot of gold. Their résumés don't appear on the job boards, but their names and activities on the Internet signal talent in myriad other ways.

According to Hanover, N.H.-based Intelligent Search, which conducts Advanced Internet Recruitment Strategies (AIRS) seminars, companies currently fill 30% to 40% of job openings by recruiting. Just a few years ago, this number was much smaller. Recruiting firms are more aggressive, and human resources groups operate more like recruiters.

Understanding how technical recruiters use the Internet to find passive candidates and what they're looking for provides great insight into how you can discreetly position yourself to be found. Passive job hunters no longer need to be passive. They can be quite aggressive in their passivity.

Pay attention to the advice AIRS gives to recruiters, suggests Mike Foster, president of Intelligent Search. This way, everyplace recruiters search for candidates, they'll find your name. "If you build a home page," Foster adds, "register it with the top eight search en-

gines, make sure its spiders/robots can find you, then you're golden."

### Build an Interesting Home Page

Online recruiters know that a personal home page often tells them more about a candidate than a résumé. And they cull through virtual communities to find them.

If you want to be discovered, build a home page and organize it as a business would. Merely posting a résumé makes you look just like everyone else on a job board. A home page should provide a creative snapshot of a full range of personal and business interests.

Kirk Sears, co-owner of recruitment firm Wilmington Group in Wilmington, N.C., says his clients are looking for well-rounded people with business knowledge, not just mercenary programmers who can swoop in for \$100 per hour. A good home page tells him a great deal about a person and his interests outside of work: Does he run triathlons? Is he an amateur photographer? If your friends would find these tidbits interesting, so would a good recruiter.

If you really want to catch Sears' eye, he recommends that you associate your name with your projects. If you've worked on one that received a lot of press, link to those articles. Make it easy for him to find your accomplishments. Make it easy for him to learn more about your company and its accomplishments. "It's hard for people to brag, but it's a mistake not to," says Sears.

Bruce Ellsworth, a recruiter at Pyxis Corp. in San Diego, looks at lots of home pages. He explains, "We're looking for content, not bells and whistles." That may be tougher advice for technologists to hear, because their home pages resemble technical experiments. Apply the same design principles to your home page that a company would; if the page is hard to download, then people won't look at it.

### Include an E-Mail Address

The bit of content that every recruiter really wants is your e-mail address, and a phone number if you're willing. The really smart recruiter wants to converse with you about long-term goals. Even if you aren't the perfect fit today, who knows what openings will appear tomorrow?

Sue Weiss, whose Silicon Valley-based firm, Weiss Group, recruits management teams for pre-initial-public-offering companies, recommends that you "look well-rounded, not just technical. Show your business sense, your common sense."

"IT people are the worst at networking," Weiss adds, "and you can quote me on that." Which brings up another interesting point: The age-old job-hunting advice about building and staying in

“  
It's hard  
for people  
to brag, but  
it's a mistake  
not to.”

KIRK SEARS, CO-OWNER,  
WILMINGTON GROUP

contact with a network of people remains just as relevant in the online world. People who don't publish and who don't belong to professional associations, user groups or newsgroups also don't show up on the Internet. Subsequently, they won't show up on an Internet recruiter's radar screen.

### Include Links

Home pages should link to any organization that might signal some expertise; these links can be to an alumni directory, a professional organization or your current company.

Recruiters use a search technique called flipping. Mark Mehler, co-author of a book on Internet job-hunting titled *CareerXroads 2000*, explains that this technique can get recruiters closer to a community of qualified candidates. Flipping finds pages linked to a specific company or professional organization.

Do the following advanced search: Linkdomain:your\_favorite\_professional\_organization.com and add the term *resume* in the keywords box. What appears is a list of sites that link to the professional organization and include résumés.

### Find a Convenient Location

Once you've built a creative, interesting home page and linked it to all the right places, you have to put the site where recruiters can find it. They typically comb the virtual community sites, such as Geocities, Tripod, Angelfire and Xoom.

Placing a home page at such sites may be anathema to a software engineer who doesn't need the sites' page-building tools and find the ads annoying. Keep in mind, however, that the point isn't to impress your techie buddies, but to be available for a date when an online recruiter comes courting.

### The Final Search

Recruiters use search engines to cull through home pages in these communities. Be sure that the top eight search engines will find your page, because

these handle approximately 95% of all Web traffic. When defining the meta-tags that these engines will reference, use words that describe skills you have and want to use.

Be sure to index your home page in a number of ways, especially if you're changing directions or acquiring new skills.

Note that the search engine for certain community sites, such as Yahoo, will pick up only the first three to five words on a home page. And most spiders review only the first 100 words on a page. Try to subtly work in a summary of skills at the top of your home page.

Stewart Morris, president of Stewart Morris Associates Inc. in Santa Monica, Calif., recommends that you think about how someone would search for a position that you might like to have. Do that search and see if and where your name comes up. Morris also suggests posting the date when you last updated your résumé and spelling out your certifications in addition to including the acronyms.

### Be Active

Although home pages are the primary sourcing mechanism for online recruiters, they aren't the only one. Online recruiters comb user groups for candidates, and the more specific the user group, the better.

Tracy Claybrooke, president of Claybrooke and Associates Inc. in Tampa, Fla., suggests that passive job seekers be included in professional associations' listings.

"Be visible, publish if you can, write articles in newsgroups," Claybrooke says. In other words, make sure your name appears on the Internet in association with your business and technical interests, as well as your geographic preference.

Kirk Sears, back in Wilmington, reviews newsgroups to see who knows what and how active they are. "Newsgroups aren't used as often because they take time [to cull through]. ... We've had good luck."

Sears points out that the people who take time to be involved in newsgroup conversations are typically the more outgoing, helpful types, i.e., high-quality passive candidates.

For people who have been deluged with calls because their name appeared as a reference on a job board, the fear of being overwhelmed with recruiting calls looms. As Sue Weiss says, "It's not about getting more calls, but better calls."

Job-hunting for the employed is like dating for the single: Being a wallflower won't get you to the dance floor. ■

Shand is a freelance writer in Somerville, Mass.

## Advice to the Manager: Fighting Off Recruiters

Online recruiting techniques take advantage of a manager's key retention tools: public acknowledgment of work well done and opportunities for employees to learn new skills and network outside the company.

Mark Mehler, co-author of *CareerXroads 2000* (List Works, 2000), says, "Companies make it too easy for recruiters by putting employee names and e-mail addresses on the Web site." Attempts to shield employees from online recruiters may annoy them more than it stymies the recruiters.

### Defensive Tactics

■ **Flipping:** Recruiters search for pages linked to a company's domain. Create a policy against linking to the corporate site and have someone check it.

■ **Mining newsgroups:** Recruiters review conversation threads to find experts, then contact them via e-mail. Ask employees not to use company e-mail when participating in newsgroups, so it's more difficult to trace their activities on the Internet.

■ **Searching home pages:** Recruiters may contact people based on information on home pages. If you link to home pages on the corporate Web site, make sure they are behind the firewall. Otherwise, these pages can be found by flipping.

—Dawne Shand



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WARREN VANDERPOOL at Cierra Industries in Auburn, N.Y.: Online exposure through Web auction sites is as important as sales

# B-to-B Auctions From A to Z

**Thinking about selling or buying through an online auction site? Know what you're getting into first, say analysts and practitioners. By Lee Copeland**

**T**HE BUSINESS-TO-BUSINESS market segment is brimming with online auction sites where companies can barter, put work out to bid, purchase or sell anything from plastic bags to multimillion-dollar electronic aerospace components. But before your company signs up to hawk or buy online, analysts and participants suggest that potential users examine what happens both online and off-line at a Web-based auction.

Most online auctions require sellers and buyers to register their name and billing information in order to conduct transactions. But in larger, more complex bids for contract services and specialty items, an auction site might check references and credit and perform other types of due diligence. Generally, the buyers or sellers, and many times both, pay a small percentage-based transaction fee.

## Blending Transaction Models

"One important value of an e-marketplace is that it allows participants to blend together different transaction models," says Bruce Tempkin, an analyst at Forrester Research Inc. in Cambridge, Mass. "This does not mean [the] entire universe will use them, but enabling new online transaction forms is an important option."

As with any marketplace, the ability to attract many qualified suppliers into the bidding process, which often involves lots of off-line marketing activity, is one of the most important requisites for conducting a good auction.

Cierra Industries Inc. in Auburn, N.Y., sells refurbished plastic processing equipment to manufacturing companies. It joined Greenville, S.C.-based Datastream Systems Inc.'s BizSurplus.com industrial procurement network in January and has sold about \$150,000 in plastic granulating equipment online. Although the sales have been small to date, Warren Vanderpool, business manager at Cierra, says the exposure is important. "We're presenting our equipment to thousands of people," he says. "Whether they buy or not, we're presenting our name, and they see that we're seriously in this business."

"As you get increasing numbers of participants in these auctions, the prices paid will decrease over time," says Tim Minahan, an analyst at Aberdeen Group Inc. in Boston. He estimates that most businesses will cut purchasing costs by 5% to 10% by using online auctions and procurement services. He said he also expects

an increase of up to 15% in savings as more buyers and sellers participate.

Glass fiber and composite materials maker Owens Corning in Toledo, Ohio, spends roughly \$3.5 billion on procurement each year. The company wants to channel half of that spending through online business-to-business auctions and other procurement systems. Thus far, Owens Corning has auctioned more than \$7 million in goods from San Francisco-based ChemConnect Inc.'s World Chemical Exchange and expects to channel more than \$400 million in supplier contracts through Pittsburgh-based FreeMarkets Inc.

## Strategic Part of Business

"We wanted to target cost savings of 5%, but we're running higher than that," says John Gellatly, electronic-procurement leader at Owens Corning. "[Online auctions and procurement have] taken procurements from being perceived as just playing golf and sitting around eating doughnuts to being a strategic part of the business."

But Gellatly said one of the most important tasks in using business-to-business auctions is creating a strong market for the auction, which requires a lot of advance work.

"We're creating a more business-neutral playing field so that the buyer and the sellers can see what the market really is," Gellatly says. "In paper bidding, the incumbent always has an advantage because requests for proposals are not always spelled out and all the suppliers are not asking all the same questions. In an electronic bid, you cannot have any outstanding questions."

"Technology is a key component, but even more compelling and challenging is the market-making activities of bringing suppliers and buyers to the table," Minahan says. "There is a good deal of hand-holding that is required, from physically talking to participants on the phone to assisting buyers during an auction event."

Some auction sites will solicit and offer training to participants and ensure that expected participants are available when an auction begins. Others offer access to services such as equipment inspections

and escrow account services, in which a third party withholds payment until the buyer takes possession.

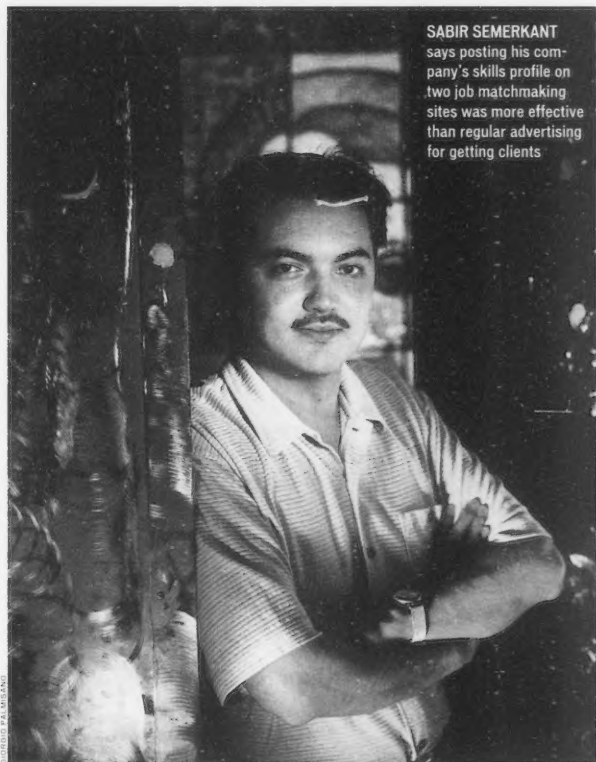
The electronic world, though, may give the word auction new meaning.

"We're not terribly fond of the term auction," Vanderpool says. "It implies desperation, liquidation and ultralow prices, and that is not what we're looking to achieve. We're looking for fair market value for our equipment, even though we're starting with a less-than-retail price." ■

## AT A GLANCE

**Forrester Research Inc.** in Cambridge, Mass., predicts business-to-business Web auction sales will explode to **\$52 billion** in 2002 from **\$8.7 billion** in 1998.

# Matchmaking On the Web



**SABIR SEMERKANT** says posting his company's skills profile on two job matchmaking sites was more effective than regular advertising for getting clients

**Independent IT consultants and employers alike say that talent-matching sites on the Web give them direct access to one another, eliminating costly agency fees.**  
By Leslie Goff

**I**N THE PAST FOUR MONTHS, Sabir Semerkant has garnered some \$2 million in revenue for his six-person consulting firm — and he hasn't paid for a single ad, sent out a single brochure, made a single cold call or negotiated with a single agency.

Semerant, CEO of Rare Minds Inc. in New York, has done it all by posting his company's skills profile on two Web sites: Monster.com's Talent Market, an auction-style site for independent consultants and contractors produced by The Monster Board in Maynard, Mass., and FreeAgent.com, an online matchmaking service for contractors and clients run by New York-based Opus360 Corp. Rare Minds works with dot-com start-ups on business planning and

Web site development. It's currently working with four clients that hired the 9-month-old company after finding it on the sites.

"The sites are pretty much our sales force," Semerkant says. "Without them, we would be cold calling or sending out marketing materials to potential clients. And as busy as we are — launching two sites every month — we can't really spend a lot of time seeking out new business. So, they're a big positive."

For small consultancies and independent information technology contractors, sites like Talent Market, FreeAgent.com and a bevy of others (see list at right) offer a hassle-free, low-cost way of building client rosters.

Even more significant, consultants say, is that the sites enable them to expand their businesses while eliminating the middleman. By sidestepping consulting agencies, contractors get higher rates, clients pay lower fees and both parties gain more control.

"It will take a few years, but agencies' usefulness — at least for contract work — will dwindle to near zero" because of these sites, says Joe FitzGerald, a Boston-based independent consultant who specializes in back-end Internet databases and applications.

From the client's perspective, matchmaking sites offer a quick way to gain staff. For example, David Tabor, founder and CEO of Tabor Interactive Inc. in Denver, says he uses Talent Market when he needs people with experience in Allaire Corp.'s ColdFusion Markup Language.

"I've found contractors for about half the rate I would pay through an agency," says Tabor, whose firm develops Web-based strategies and tools for high-tech companies, including Qwest Communications International Inc., Siemens AG and Lucent Technologies Inc.

The sites employ various models of placing and accepting bids for work. At Talent Market, consultants post their profiles, along with their rates, and potential employers respond with auction-style bids for the consultant's services on specific projects. At FreeAgent.com and similar matchmaking sites, both consultants and clients can post profiles and search one another's listings.

In another model, employers post requests for proposals for specific projects, along with what they're willing to pay, and consultants respond with quotes. Advice exchange sites, in a loose adaptation of the auction model, enable clients to post specific problems or questions, and consultants can respond with bids to provide solutions.

Sites based on the latter model aren't designed to land big gigs for consultants but can be useful marketing tools, says Joseph Shapiro, an independent C++ and Visual Basic developer based in Shelton, Conn., who specializes in Web site development. Shapiro has resolved discrete problems for three programmers via Menlo Park, Calif.-based EXP.com Inc., such as providing guidance on available technologies to accomplish specific tasks or providing snippets of code to work around a programming snafu. ▀

*Goff is a freelance writer in New York.*

## Site Seeing

### Auction-style contracting and advice-exchange sites:

- **EXP.com Inc.** ([www.exp.com](http://www.exp.com))

An advice exchange service that covers a wide range of subject areas, including the Internet and technology (the most active area, according to EXP.com).

- **HelloBrain.com** ([www.hellobrain.com](http://www.hellobrain.com))

An IT-specific advice exchange service that allows buyers (clients) to post queries for solutions to specific problems, along with the price they're willing to pay. Sellers (contractors) respond with bids to resolve a problem.

- **Talent market at Monster.com**

([www.talentmarket.monster.com](http://www.talentmarket.monster.com)) Contractors post their profiles, rates and the type of projects they are seeking; potential clients place bids for their skills and services.

### RFP-oriented sites:

- **BizBuyer.com Inc.** ([www.bizbuyer.com](http://www.bizbuyer.com))

Employers post requests for proposals (RFP). Contractors, who create skills profiles, are notified when RFPs match their profiles and may then submit customized quotes to the employers.

- **SmarterWork.com** ([www.smarterwork.com](http://www.smarterwork.com))

Clients post projects and the prices they're willing to pay; contractors review projects that match their skills profiles and submit proposals and bids.

- **eWork Exchange Inc.** ([www.ework.com](http://www.ework.com))

A site designed to hook up project managers with contractors for Web-based and other IT projects. Fees are collected from both buyers and sellers, based on a free-market pricing model.

### Matchmaking sites:

- **FreeAgent.com** ([www.freeagent.com](http://www.freeagent.com))

- **Guru.com** ([www.guru.com](http://www.guru.com))

FreeAgent.com and Guru.com's Web sites allow both contractors and clients to post profiles and search one another's listings.

- **Newmediary.com Inc.**

([www.newmediary.com](http://www.newmediary.com))

It's not IT-specific, but it is IT-oriented, aimed at "Internet economy" companies. Consultants and service providers who register their skills profiles gain access to RFPs that match their experience.

# Sabbaticals & SECOND WINDS

**IT workers praise sabbaticals for giving them a new lease on life. So why are so many managers worried about granting them?**

**BY DAWNE SHAND** As the fortunes of companies ebb and flow, so do their sabbatical programs. These aren't the simplest benefits programs to manage, but they draw much attention.

A work-weary employee imagines that a sabbatical is a break from the action, a chance to learn something new or rethink priorities. The information technology manager thinks: We can barely cover the workload as it stands.

Here's advice from both parties on the program's risks and rewards:

## The Manager's Perspective

For those who worry that a sabbatical offers its recipient time to look for a better job: don't.

A sabbatical opportunity shouldn't be the first catalyst for talking about a person's future, says Cathy Hirsh, a vice president at IT consulting firm American Management Systems Inc. (AMS) in Fairfax, Va.

When an AMS employee becomes eligible for a sabbatical, "we talk about their recent history and what's coming up. If they're unhappy or having second thoughts, these issues should come up and be resolved," explains Hirsh.

Susan Harrell, a managing director of the technology innovation enterprise at San Francisco-based Charles Schwab & Co., has never had an employee disappear during a sabbatical. "In this job market, it's too easy to make a change. You don't need a specific time frame [to accomplish this]," says Harrell.

Schwab offers its employ-

ees a four-week sabbatical after five years of service. In the past, an employee could take an eight-week sabbatical at 40% pay. Now, a four-week, fully paid sabbatical is available. Under the new guidelines, Schwab anticipates that 1,000 employees will take their sabbatical each year.

With this many extended absences, covering the workload of an employee is a formidable task. But employees willingly take on additional work to minimize the impact. Harrell, who took an eight-week sabbatical in 1998, claims that "people jump in and go the extra mile to pick up the specific pieces." And companies hire contractors.

Neither company obliges its employees to justify how they will spend their time. Both companies see benefits to the program that go beyond good morale. "People come back with new energy, they think about work in different ways," says Harrell.

## The Employee's Perspective

Employees who have taken sabbaticals tend to agree that they returned to work with a new lease on life. Debra Carmody-Poon, a technical director at Charles Schwab, says, "I was ready to go back and take on new things," after spending two months with her 2-year-old son and traveling.

When the human resources department notified Carmody-Poon, a 10-year veteran of the company, of her eligibility for a sabbatical, she took it. Not that

work — though challenging — was a problem, she just wanted the chance to spend time with her son.

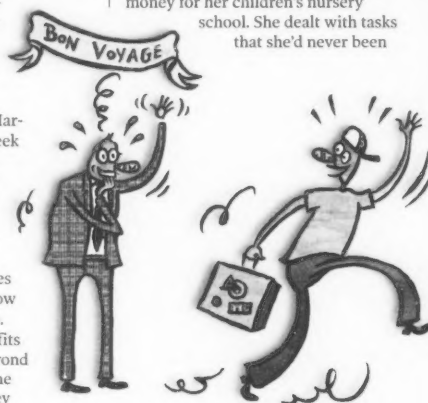
Leaving for an extended period does pose risks. "This is such a fast-paced, results-driven environment; if you're not there to raise your hand, then an opportunity can pass you by. But so much is going on," Carmody-Poon says.

When she returned to Schwab, many changes had taken place. Her group had begun taking on new roles before her sabbatical. Catching up on what decisions had been made and how responsibility had been delegated was challenging. However, interesting opportunities to shape the group's new responsibilities also became available, she says.

Like Carmody-Poon, many people vacation during their sabbaticals or spend extensive time with their families. Others learn new skills.

Nathan Ainspan, a research associate at The Conference Board Inc. in New York, likens sabbaticals to training programs. "In high tech, skills get antiquated quickly, and most people are concerned about being current." In the war for high-tech talent, offering the opportunity to learn new skills attracts motivated employees.

Other people put their skills to use for volunteer organizations. Sue Hanley, a principal at AMS, spent her first sabbatical planning a concert to raise money for her children's nursery school. She dealt with tasks that she'd never been



exposed to: booking venues, selling tickets, coordinating lighting and setting demands from artists.

People who volunteer typically apply workplace skills to an avocation, finding satisfaction in helping others and, in turn, gaining new perspective.

When Hanley, who has taken two sabbaticals in her 18 years at AMS, reflects on the benefits of these extended leaves, she notes, "I was able to reflect on what was important in my life."

*Shand is a freelance writer in Somerville, Mass.*



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# Sustainable Growth

BY MARK HALL

**L**AST YEAR, when Federal Reserve Board Chairman Alan Greenspan told the U.S. Senate Joint Economic Committee that "an impressive proliferation of new technologies is inducing major shifts in the underlying structure of the American economy," he had information technology in mind.

The chronically downbeat Greenspan acknowledged in his testimony that the record-setting economic growth in the U.S. at the time was due in large measure to "newer forces" in the economy. IT had become a critical variable in what the Fed chairman called "our underlying monetary policy objective: maximum sustainable economic growth."

In other words, the old rules no longer apply.

## Controversial Term

Sustainable growth is a controversial concept, particularly among environmentalists, who see it as theoretically impossible. In *Valuing the Earth: Economics, Ecology, Ethics* (MIT Press, 1993), Herman E. Daly and Kenneth N. Townsend claim that "the economy is an open subsystem of the earth ecosystem, which is finite, non-

growing and materially closed. ... The term *sustainable growth* when applied to the economy is a bad oxymoron — self-contradictory as prose, and unvocative as poetry."

Nevertheless, sustainable growth is the official policy of the U.S. Federal Reserve and many American corporations. They assume that economic or revenue growth from existing resources is less susceptible to inflationary forces and therefore can be sustained for longer periods.

By all accounts, IT is becoming a linchpin to successful sustainable growth.

"IT tools are a support mechanism for any business to achieve sustainable growth," says Tim Galpin, author of *Making Strategy Work* (Jossey-

## DEFINITION

1. A business strategy to expand revenue that isn't dependent on mergers or acquisitions. Sustainable growth develops new markets or services from ongoing operations.
2. IT services dedicated to corporate revenue generation such as e-commerce, virtual exchanges and other fee-based online operations.

Bass Publishers, 1997) and global practice leader for mergers and acquisitions at Watson Wyatt Worldwide, a Bethesda, Md.-based consulting firm. "Management is learning about how IT can be a facilitator of income growth, not just a cost center."

Win Liu, who teaches management science at Baltimore-based Johns Hopkins University's MBA program, agrees. He adds that innovation and time-to-market issues are critical to help a company attain sustainable growth.

"IT is quite different [from] traditional business operations in chemicals or restaurant chains, for example, because of the pace of the industry," Liu says.

## New Markets

Innovation is what Sonoco Products Co. had in mind four years ago, when it began a program dedicated to sustainable growth. Sonoco used IT to help make its existing services more efficient as well as to create new services.

For example, the 101-year-old Hartsville, S.C.-based provider of packaging products replaced its aging mainframes with Hewlett-Packard Co. Unix servers to track and stock packaging products from other suppliers for its top customers. The new service helped earn revenue while improving customer service and interaction.

"We're very good at cost control, but we need to develop top-line revenue growth

IT tools are a support mechanism for any business to achieve sustainable growth.

TIM GALPIN, GLOBAL PRACTICE LEADER,  
WATSON WYATT WORLDWIDE

with new products, getting into new markets and services," says Sonoco CIO Bernie Campbell. "IT can play a role in all of these."

## Move Fast

IT is a fast-paced environment, and managers at the forefront of sustainable growth programs must be comfortable with the speed such a strategy requires.

In traditional businesses, most things develop over long periods of time, explains Liu. "In IT, things are created daily," he says. "In old industries, you have time to make up for your mistakes. In IT, that's not the case," he says.

As part of its sustainable growth program, Sonoco set up a new supply chain for its flexible-package division, and IT response time was put to the test.

"In a supply chain, things happen at breathtaking speed," says Henry Lander, Sonoco's supply-chain director.

The company has to link the nine plants throughout North America in its flexible-package division with numerous suppliers and customers. A change in one part of the chain swiftly affects other parts.

"You need strong internal controls, and you need to keep on top of them," Lander says.

In a tightly coupled supply chain, Campbell adds, "you can reduce inventory and waste."

## Motivation Is Key

Smart, happy employees are the linchpin to sustainable growth, according to Larry Emond, senior vice president at The Gallup Organization in Princeton, N.J.

But employee motivation in Fortune 500 companies seems to be lagging. Gallup research indicates that growth from existing business was a paltry 0.1% in 1998. Mergers and acquisitions account for most of the revenue expansion of the top companies in the U.S.

Emond places the blame squarely on the shoulders of managers who don't recognize the importance of employee motivation. Customer loyalty, he says, is the No. 1 problem facing CEOs. Employees are the public face that most customers encounter, but workers often lack necessary training. That's especially true in call centers, where turnover is high and employees tend to be underpaid and uninspired.

Technology can be a useful tool for motivating employees in order to achieve sustainable growth. Many companies, for instance, use intranet portals to attract and retain staff and train them in new systems.

"Education can help achieve strategic growth goals," Galpin says.

Educated employees are more motivated and greatly improve a company's chance of reaching its growth goals, he says. ▀



## A Formula for Growth

Sustainable growth is a hot topic in finance. Economists use it as a model to evaluate the state of nations as well as the upside and downside of public companies' finances.

To get an introduction on calculating the sustainable growth potential of your own company, a competitor or any public enterprise, Alexandria, Va.-based consultancy Kathleen Sindell Ph.D. Consultants has published a formula on its Web site, [www.kathleensindell.com/sustainable.htm](http://www.kathleensindell.com/sustainable.htm).

Company founder Kathleen Sindell says she uses the formula to determine whether companies are adequately funded to reach their public growth pronouncements.

She says CIOs need to develop their own benchmarks to determine whether they have the capacity to meet growth expectations. Some of the variables to consider are technology performance and its capacity, technical staffing levels and skill sets, project budgets and the company's ability to finance the IT growth strategy. — Mark Hall

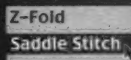
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## Vendor-management programs can pay off

**A** SMALL BUT GROWING NUMBER of companies are implementing programs to assertively manage relationships with key vendors. With the ever-increasing influence that technology vendors and their products exert on business capabilities, customers see the need to manage these resources more carefully to ensure they accomplish their strategies.

Such vendor-management programs vary in structure but usually include a designated "vendor/manager" from the customer side. This vendor/manager's interaction with other customer stakeholders in the vendor relation-

ship is key, as is coordination with the customer's information technology architecture and standards organizations.

Managing vendors and all facets of the relationships — from controlling sales contacts to ensuring contractual compliance — takes time and effort, so it also costs money. But you can more than make up for that because the program saves more than it costs.

Two cases in point: A major insurance company reports an average savings of \$300,000 per month just by cross-checking all vendors' invoices with what their contracts allowed.

More remarkable, a major telephone company saves an average of \$1 million per

month by catching overbilling by vendors.

But what about other benefits? Companies with these programs cite the following benefits from key operational and strategic/tactical components of vendor management:

At an **operational level**, the goal is to establish focal points for monitoring compliance, problem resolution, vendor product introduction and negotiation control. Benefits include:

- Consistent service in all of a customer's facilities around the world.
- The vendor/manager can consolidate buying power by knowing what the entire company spends on the vendor's products.
- Problems are documented

or resolved in ways that are consistent with the customer's strategy for that vendor, including how problems are escalated within the vendor's and customer's organizations for resolution.

- Problem-escalation methodology is understood by both sides of the table, saving time and increasing productivity.
- Better performance from vendors who know they're being closely monitored.
- Duplicate problems within a large, decentralized organization are eliminated.
- Problems are fixed and stay fixed because of consistent vendor/client communication.
- Problem-resolution cycle time is reduced because the process for it has been de-

fined and communicated.

- There are fewer telephone sales pitches from vendors to customer staff, cutting down on some vendors' divide-and-conquer tactics.
- Product or version introduction is handled according to the customer and vendor's jointly

planned and coordinated strategy for the product type.

On a **strategic and tactical level**, the goal is to establish alliances with vendors to mutually plan, set requirements and establish measurement.

Benefits include:

- Vendors send advance notification of new products and versions through the vendor/manager and should no longer market new products to multiple points within the customer's organization.
- A customer can gain input into the vendor's product-planning process.
- As a result of jointly forecasting with the customer, a vendor can lower its costs by better planning production and distribution, passing the savings on to the customer.
- The customer will receive the product when it is

needed, usually just in time.

- The customer will be able to provide clear, consistent, focused and timely feedback to the vendor, which improves the whole process.
- The parties can improve the supply-chain process through mutual and thor-

ough examination of the vendor's processes and the customer's requirements, and implement mutually beneficial and cost-efficient changes.

With these improvements, both sides can save money, and the vendor can be ensured a given level of business in the long run. The customer is assured a consistent, high-quality supply of product.

There are mutual benefits from such programs. While some vendors will undoubtedly perceive these programs as threats, they can actually represent significant opportunities for additional business and process improvement for vendors who are willing to play by these rules.

And there's always a chance the vendor will become a better vendor because of them. ■



JOE AUER is president of International Computer Negotiations Inc. ([www.dobetterdeals.com](http://www.dobetterdeals.com)), a Winter Park, Fla., consultancy that educates users on high-tech procurement. ICN sponsors CAUCUS: The Association of High-Tech Acquisition Professionals. Contact him at [joe@dobetterdeals.com](mailto:joe@dobetterdeals.com).

## BRIEFS

### Poor Communication Tops List of Mistakes

Poor communication with information technology staff was cited as the most common mistake made by companies in a study conducted by Menlo Park, Calif.-based RHI Consulting Inc.

The survey asked 1,400 CIOs from U.S. companies with more than 100 employees to choose the biggest mistake companies make in managing IT employees. More than half (52%) said poor communica-

tion topped the list. Other survey responses included lack of praise (17%), lack of flexibility in scheduling work hours (8%), lack of authority given to employees (7%) and lack of training or educational opportunities (3%).

### Equinix Offers Data Management Services

Equinix Inc. in Redwood City, Calif., has signed an agreement with StorageNetworks Inc. in Waltham, Mass., in which the storage service provider will offer managed data storage and professional services to customers in Equinix

Internet Business Exchange centers nationwide.

### Meta Group Launches New Division

Stamford, Conn.-based Meta Group Inc. last week launched a new corporate division — [Metagroup.com](http://Metagroup.com) — and named Peter Burris, the company's senior vice president and co-research director, as the division's president and CEO.

The division will focus on providing clients with interactive, online access to problem-solving models, value-measurement models, electronic-learning capabilities, com-

munity gathering places, e-commerce evaluation tools and Meta Group's IT research.

### Mobile Phone Makers Team Up

Motorola Inc. in Schaumburg, Ill.; LM Ericsson Telephone Co. in Stockholm; and Nokia Corp. in Espoo, Finland, announced last week a joint project to create an open industry framework for secure, mobile electronic transactions.

According to the three companies, they expect to issue more information on their Web sites by the end of next month and to for-

mulate an open framework before the third quarter.

### McData Names CIO

McData Corp. last week named Don Wenninger as its CIO. He will oversee the Broomfield, Colo.-based company's global IT strategy and the integration of process systems, business systems, supply-chain integration and worldwide e-commerce. Prior to joining McData, Wenninger was vice president of IT at Vixel Corp., a Bothell, Wash.-based switch company. McData is a provider of data center networking systems, including Fibre Channel director and switch products.



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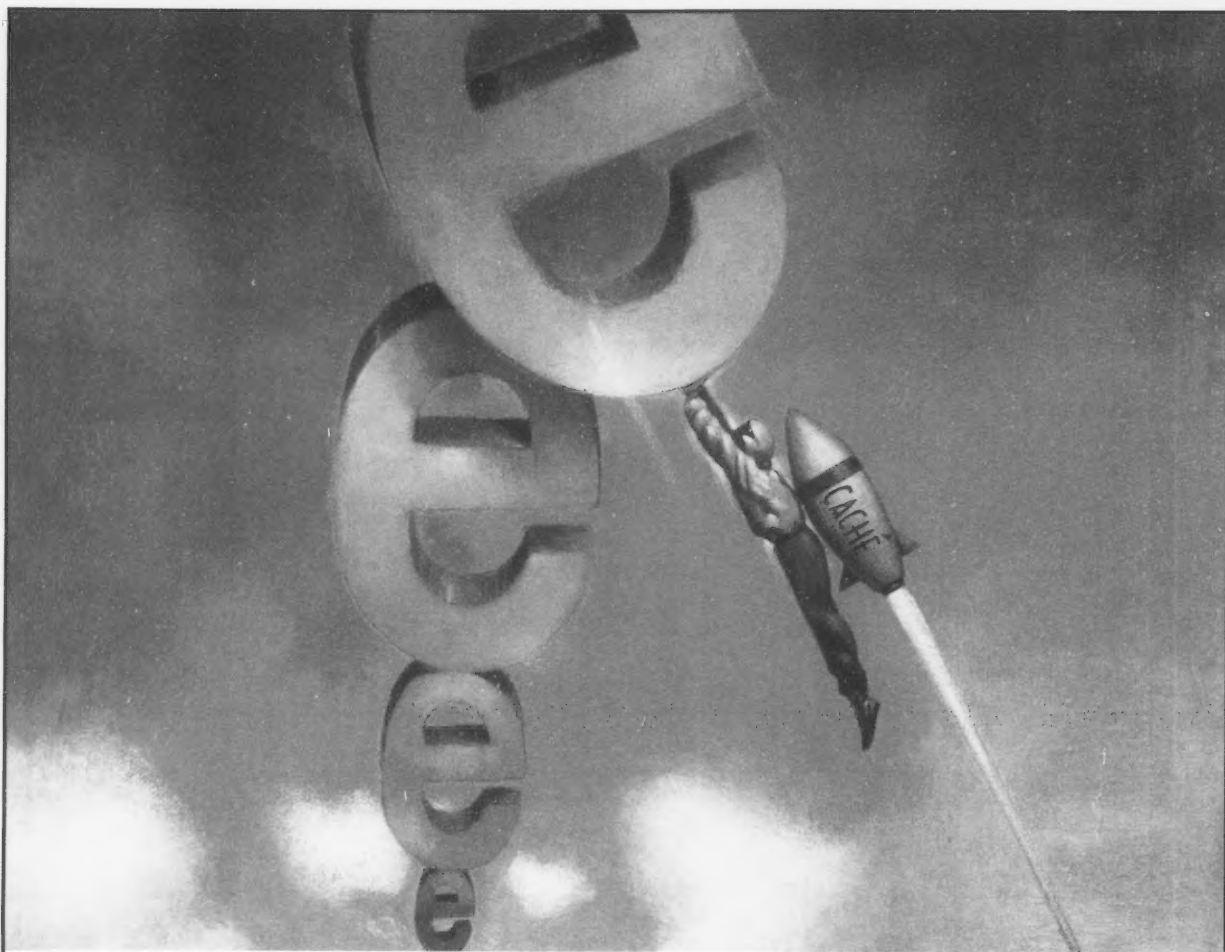
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# TECHNOLOGY

## HANDHELDS DRAW FIRST BLOOD

Hospitals, clinics and paramedics are beginning to use handheld computers to gather patient information and track procedures. Project managers say the biggest obstacles to overcome are users who aren't very open to new IT practices. **65**

## CONFUSED? YOU'RE NOT ALONE

Nine months after the Sun/Netscape Alliance signaled its intention to discontinue Sun's NetDynamics server, customers are still confused over what this means for their applications. Senior editor Carol Sliwa quizzed the alliance about ship dates, development tools and upgrade plans. **65**

## LOOK MA, NO HANDS

General Motors plans to offer a voice-activated cellular Infotainment system as an option in some models of its 2001 Cadillacs. **66**

## SECURITY JOURNAL

In Week 6, Pat finds how time-consuming and tedious his job can be when he mistakenly messes up the log files he needs to scan for attempted hacks. And hey, he asks, how about security managers helping one another write security policies so they don't have to rely on expensive books? **70**

## ORACLE SHIPS PLANNING APPS

Oracle has started shipping supply-chain planning software that's expected to play a big role in the online exchanges it's setting up with users in markets such as the auto and retail industries. **67**

## HANDS ON

The latest digital cameras offer good value and better pictures. And now they even come with their own operating systems and add-on applications. **73**

## QUICKSTUDY

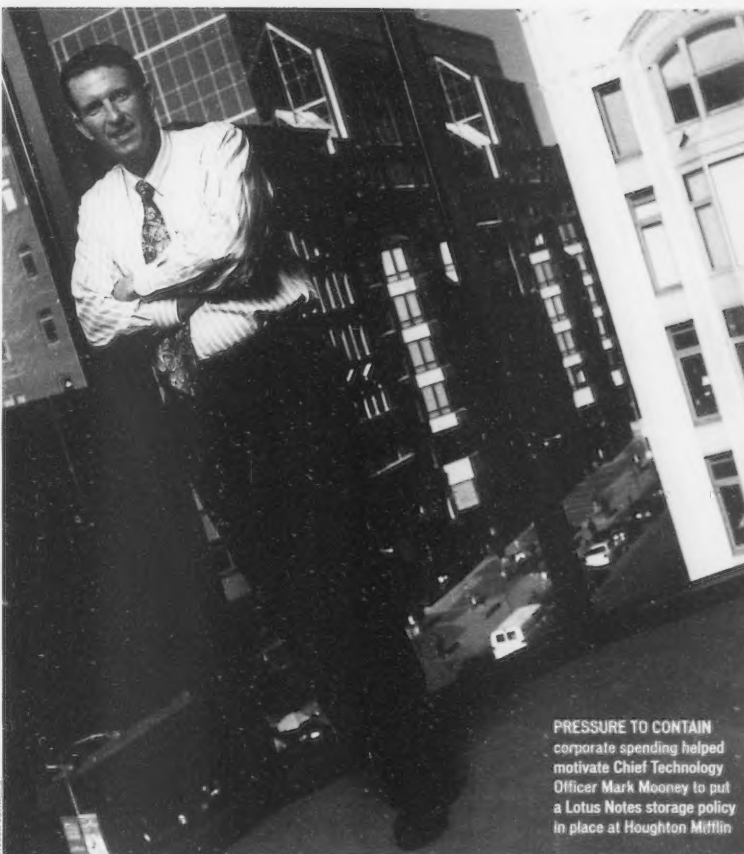
A tutorial on file transfer protocol, the standard for moving files across IP-based networks such as the Internet. **74**

## EMERGING COMPANIES

Start-up FireDrop Inc. builds interactive features in what used to be ordinary "static" e-mail. The addition may help companies get more responses to customer surveys. **82**

## SOUTHERN HOSPITALITY

When you think of high-tech meccas, Atlanta probably doesn't top your list. A new local campaign aims to change that by letting the rest of the world know that the city extends Southern hospitality to players in the new economy. **86**



PRESSURE TO CONTAIN corporate spending helped motivate Chief Technology Officer Mark Mooney to put a Lotus Notes storage policy in place at Houghton Mifflin

## STEMMING THE STORAGE TIDE

AS COMPANIES FIND that employee habits eat up network storage space, they turn to new software and management tools to slow the groundswell of stored data. IT managers that *Computerworld* spoke to said they controlled the data flood that was filling up their servers by imposing storage policies and using storage resource management software to monitor available space.

# 76



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# Handheld Computers Draw First Blood With Medical Apps

*But development time is slowed by users trained in old procedures*

BY MATT HAMLEN

**H**ANDHELD computers are beginning to be used effectively in health care to reduce errors and increase efficiency, according to project managers.

Early deployments and trials of handheld computers show that doctors, nurses and technicians are using the devices to speed billing and admittance and to help safeguard the administering of drugs and the taking of blood samples.

The relatively new technology has been slow to catch on in medical settings, according to industry observers. Although most doctors carry cellular phones and pagers, hospitals are "not big on information technology," according to Jack Gold, an analyst at Meta Group Inc. in Westboro, Mass. One reason is that it's difficult for professionals to comfortably combine existing procedures, such as drawing blood, with the use of new devices, Gold said.

As a result, putting handhelds in health care settings requires more development time than in many other industries, if only to ensure user acceptance, according to project managers.

"We spent most of our time in rolling out our handheld applications because our integrator [a division of medical supply vendor Beckton, Dickinson and Co.] had the technology but didn't have the clinical experience that we had and didn't know where to make the handheld technology force a user to do things to avoid mistakes," said Michael Mutter, pharmacy manager at The Valley Hospital, a 420-bed facility in Ridgewood, N.J.

Valley is starting a 10-week beta test in which nurses administer medications to patients, using SPT 1700 barcode-scanning handhelds from Symbol Technologies Inc. in Ridgefield, N.Y., that run the

Palm operating system from Palm Inc. in Santa Clara, Calif.

For the past year, Valley has been gathering blood samples from up to 30% of its patients, using handhelds and software from Franklin Lakes, N.J.-based Beckton, Dickinson to guide technicians and see that blood is taken from the right patient and properly labeled.

The hospital took pains to make sure the functioning of the technology would match as closely as possible the process used by its professionals, Mutter said. Nurses and health care professionals "have a lot of ownership" in their procedures for administering drugs and drawing blood, he said.

Using a handheld at Valley, a technician must scan bar codes on his identity badge, the patient's wrist and the patient's record before the computer will grant permission for the technician to draw blood. After the blood is drawn, another bar

code is printed from a small Symbol printer attached by a cable to the handheld computer and is affixed to the specimen.

Mutter said the process is reducing specimen collection errors to zero, compared with four to six per month under the typical procedure.

"[The] biggest obstacle in introducing handhelds is making sure that people understand the shift in the thought process that goes with data collection

in different forms," said Eric Gee, a project manager at American Medical Response in Aurora, Colo. Gee is working to give up to 250 paramedics in 17 towns in San Mateo County, Calif., handhelds from Palm. When the project kicks off next month, paramedics will log information on emergency cases and capture a signature from a hospital official on the handheld when a patient is admitted to the hospital.

The American Red Cross in Arlington, Va., is moving toward making a major change to its paper-based blood donation process in a year. Project manager Christopher Patton said the process will eventually provide donors entering one of 450 daily blood drives nationwide with either a Windows CE or Palm OS handheld.

The donors will answer 40 questions on the handhelds instead of on a paper form as they do now, ensuring that they answer all the questions and reducing the time needed to input the information.

"Knowing it would be faster may encourage people to come out and donate," said Karla Heller of Bellevue, Wis., who has donated many times. ■



THE RED CROSS says it's planning to move away from its paper-based system at blood drives. Within a year, donors will fill out information on a Windows CE or Palm OS handheld device

## Sun/Netscape Alliance Official Clarifies Plans

*Changes ahead for application server*

BY CAROL SLIWA

Nine months ago, the Sun/Netscape Alliance announced that it would base its forthcoming iPlanet Application Server — due out next month — on code from Netscape Communications Corp.'s application server rather than Sun Microsystems Inc.'s NetDynamics server.

Since the NetDynamics code isn't being carried forward into new products, customers are now sorting out what it means for their Web applications.

Some users have also ex-

pressed confusion over how the development tools Sun acquired last fall from Forte Software Inc. fit into the picture.

"Our strategy is to have our application server be integrated with [Forte's] Java development tools," said Sanjay Sarathy, the alliance's director of product marketing for application server products. However, the iPlanet application server will be sold by the alliance, while the Forte tools will be sold by Sun's Forte division.

As for iPlanet's overall development tool philosophy, "we have an open tools strategy," Sarathy said. "The developers should use the tools that best fit their development pro-

files and their development capabilities." The alliance will offer its own tool, iPlanet Application Builder, which is based on Netscape Application Builder. The iPlanet tool, which will be sold separately, will have more sophisticated functionality and wizards than the old Netscape tool, he said.

With regard to support for the latest Java technology, the alliance hopes to complete the testing that will ensure that iPlanet Application Server is compliant with Sun's Java 2 Enterprise Edition (J2EE). "That is our goal," Sarathy said, adding that the server already has J2EE functional capabilities.

Existing customers with maintenance or support contracts for either the Netscape or NetDynamics servers will get the new iPlanet server at no extra cost. A CD will include the latest version of NetDynamics 5.02 for customers

who want to continue to run their applications in the native NetDynamics mode, Sarathy added.

iPlanet plans to support NetDynamics through 2002. ■

**The developers should use the tools that best fit their development profiles and their development capabilities.**

SANJAY SARATHY, DIRECTOR OF PRODUCT MARKETING FOR APPLICATION SERVER PRODUCTS, SUN/NETSCAPE ALLIANCE

## Cadillacs to Get Voice-Activated Calling by Year's End

BY LEE COPELAND

General Motors Corp. last week accelerated its drive to provide embedded cellular and Web-based services in its

vehicles. The Detroit-based automaker said it will offer a Communiport Infotainment PC system developed by Delphi Automotive Systems Corp. in Troy,

Mich., in new Cadillacs by the end of this year.

GM officials touted the cellular system as being safer to use while driving than a phone handset. Using a dashboard-based, voice-activated computer, drivers will be able to listen to e-mail messages and make cellular calls. The system is integrated with the vehicle's radio and also features a CD-ROM drive, a navigation system and a voice memo recorder. Drivers would have to forward messages from their existing messaging system to a GM-based account in order to access them from the road.

The Infotainment system will be carried as an option in Cadillac's 2001 luxury Seville and DeVille models. Officials estimate that the voice-controlled system will cost approximately \$2,000 per vehicle.

According to GM, 75% of Cadillac owners surveyed recently expressed an interest in in-vehicle e-mail access and other online services. The automaker plans to extend the Infotainment system to its lower-end vehicles at an unspecified later date, officials said.

### Hands-Free Service

In a separate initiative, GM will equip approximately 1 million vehicles with embedded, hands-free cellular services by year's end, with more than 4 million automobiles equipped by 2003. Vehicle

owners will have to subscribe to a service, GM Virtual Advisor, in order to use the embedded system.

The annual fee for the service subscription will start at \$195. Callers will receive cellular access through Verizon Wireless, a new joint venture founded by Bell Atlantic Corp. and VodafoneAirTouch PLC. When making cellular calls from their vehicles, subscribers will pay line charges in addition to the subscription fee.

More than 160,000 vehicle owners subscribe to the automaker's OnStar service, an onboard system that offers navigational, emergency and concierge services. Industry analyst David Cooperstein at Forrester Research Inc. in Cambridge, Mass., said the partnership with Verizon Wireless will make the cellular services now offered through OnStar easier for GM to manage.

"The big advantage to the relationship with Verizon is that there seems to be less barriers to connect to cars by phone," Cooperstein said. "The next issue for GM to address is number portability — being able to use the same [cellular] number in the vehicle. It's nice to know that you can go to work and other points and still maintain a seamless connection by voice, and ultimately in Cadillacs, by data as well."

Dearborn, Mich.-based Ford Motor Co. has also announced plans to make voice-activated Web access, navigation and safety systems available in its vehicles by the end of this year. ■

### JUST THE FACTS

#### GM Initiative

General Motors' cellular and Web access plans:

- Embedded cellular services in 1 million vehicles by year's end
- Annual subscriptions to GM's Virtual Advisor costing \$195 to \$399
- Communiport Infotainment system in 2001 model-year Cadillacs

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GM's OnStar Virtual Advisor system will enable drivers to access multimedia communications



## Oracle Ships Planning Tools for Its Online Exchanges

BY CRAIG STEDMAN

Oracle Corp. has started shipping supply-chain planning software that's expected to play a central role in the online exchanges it's setting up with the Big Three automakers and customers in other industries.

The software, which pits Oracle against vendors such as Dallas-based i2 Technologies Inc., was released late last month along with an upgrade of its enterprise resource planning (ERP) applications. Both products had been due last fall, but shipments were delayed.

The planning tools and ERP software will be marketed for internal use by Oracle's current application users and by companies in industries such as process manufacturing and aerospace.

### Business-to-Business Also Aided

But the software will also be a key part of the business-to-business exchanges that Oracle is developing with customers such as Hoffman Estates, Ill.-based Sears, Roebuck and Co., San Francisco-based Chevron Corp. and the major automakers. The latter project also will involve Oracle rival Commerce One Inc. in Walnut Creek, Calif.

For example, executives at Ford Motor Co. in Dearborn, Mich., have said they hope to use Oracle's production and supply-chain planning capabilities as part of an auto exchange to speed manufacturing and to reduce inventory costs for itself and its suppliers. The new software, called Oracle Advanced Planning and Scheduling, was designed to handle demand forecasting and shop-floor scheduling (see chart).

Karen Peterson, an analyst at Gartner

Group Inc. in Stamford, Conn., said Oracle needs the supply-chain tools to make the online exchanges it's setting up more than just forums for automating procurement activities.

But Oracle is late to the supply-chain game and has "a significant amount of work to do to catch up" to i2 and even to ERP rival SAP AG on functionality, said Peterson. "We'll be watching very closely for the next six months to see how well they can actually do that."

One of the first customers to buy the new tools was Odwalla Inc., a maker of juices and nutrition bars. Gary Hensley, director of information technology at the Half Moon Bay, Calif.-based company, said he plans to start using the supply-chain software next year after installing Oracle's financial applications.

The \$110 million company wanted an integrated set of ERP and supply-chain applications from a single vendor, and Hensley said Oracle's new planning tools should be able to handle Odwalla's needs without requiring "a tremendous amount of resources" to install.

### What It's All About

Oracle's new supply-chain software can automate the following jobs:

- Forecasting product demand
- Scheduling manufacturing production work
- Calculating order delivery dates
- Designing distribution networks and transportation plans

fixed it. All 6 million of its combined e-mail users should now have complete access to their accounts, she added.

"During the process of upgrading our WebMail product for faster speed and better spam protection — and integrating it with Netscape Instant Messenger — some users got an error message that said the server was temporarily unavailable, and a small percentage of people — 2,000 — were not able to change their names," Bentley said. "But we acknowledged we had a problem and fixed [it]."

Bentley said Netscape sent a message to users saying the company would be upgrading the service over the next several months, but users — who flocked to Netscape message boards — said they had no idea why they couldn't access their accounts.

Edward M. Roche, an analyst at The Concoors Group Inc. in Cambridge, Mass., said systems integration problems like the one suffered by Netscape often occur after a merger. America Online Inc. acquired Netscape in 1998. ■

"We're a small company for now, and we needed software that was easy to use," Hensley said. He added that buying a more established stand-alone sup-

ply-chain package "would be overkill."

Like SAP, Oracle is using advanced planning algorithms developed by French software vendor Ilog SA. Specific pricing wasn't disclosed, but Oracle said license fees should start at \$20,000 to \$30,000 for a \$50 million company. ■

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## Netscape Users Lose E-Mail

BY LINDA ROSENCRANCE

A software glitch that occurred late last month temporarily knocked out service for 2,000 users of Netscape Communications Corp.'s WebMail service.

Mountain View, Calif.-based Netscape confirmed that the problem occurred while it was working to combine the e-mail names of Netscape Netcenter, CompuServe and America Online Inc. e-mail users into one database to upgrade the WebMail service.

The overlap of names caused Netscape to ask some users to change their e-mail names. The company said a software glitch caused about 2,000 people to be locked out of their accounts.

Netscape spokeswoman Anne Bentley declined to discuss specifics of the problem, but she said the company had

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# I am data





**I am data.**

**And I am a challenge.**

**I confound the Chairman,**

**confuse the co-worker,**

**and mystify all mere visitors**

**to the digital domain.**

**But some know**

**that with this science**

**comes this security**

**for Chairman and co-worker alike:**

**I put their progress first.**

***Does anybody put me first?***

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# Stupid Batch Tricks Interfere With Work

*Week 6: Pat messes up his own log files, wasting time he doesn't have. So what else is new?*

**P**EEKABOO, I see you! I have a crazy little program running in my lab called ScanIP 2.0. Some sick person wrote an application that will scan an Internet Protocol range and then map any shareable device a computer has open — hard drives, CD-ROMs, printers and more. Just think — some kid with nothing better to do can sit down at a PC with cable modem access or a Digital Subscriber Line, open a window to your PC and delete any file he sees, copy any document you have or move your Quicken files or e-mail messages and hold them for ransom.

I was going to spend my time this week in my lab trying everything I learned in the firewall class I took last week, but it seemed like everyone needed me every minute of every day.

## What, No Command Line?

I was trying to write a little .bat file that would run commands on the firewall using the AT scheduler in the Windows NT Resource Kit. Our logs of firewall activity are around 200MB to 300MB, and it takes a lifetime to open them and manipulate the data. The documentation that comes with Check Point Software Technologies Ltd.'s Firewall-1 is really good and detailed, but of course it doesn't give you real-world examples. I grew up in Windows. Granted, I learned Basic in the third grade, but I haven't really worked in or learned my way around a command-line environment. I did a search on [www.securityportal.com](http://www.securityportal.com) (a great site for Firewall-1 and also a wonderful search engine) and found a couple of sample scripts that people had posted. I plowed through them.

I wanted to switch the logs to a different directory, delete the old logs and then use the export feature so I could later import the data into Microsoft Access or any SQL database for massaging. The problem is that when you type "fw logswitch (name)" in Firewall-1 it will take the current log and name it

"whatever-you-called-it \*.log," but it keeps the old data in the buffer. It then continues to build on it, so you have to stop the service and delete the logs in the \\fw\log directory.

The aim was to create and export a file with only the latest information I wanted to analyze. Don't worry — when you type "fwstart," it will create new logs, giving you a fresh start. When I wrote the part of the batch file where I wanted to delete the old logs, I wrote "del /q \*.\*" That deletes all the files, no questions asked.

That wasn't good, because I wiped out the files I wanted as well as those I didn't want. That happened because I had the batch file in the \\winnt\fw\bin, where the rest of the firewall executables and batch files are located. After I ran the batch file

up, it successfully switched the logs and then deleted all the executables and batch files in the \\winnt\fw\bin directory instead of the \\winnt\fw\log directory. Duh!

Needless to say, I was quite upset with myself. By this time, it was 5:15 p.m. and I had tickets to the symphony, so I figured I would reinstall again later.

The next day I spent an hour trying to uninstall Firewall-1 and reinstall it, but it kept saying the license was wrong, so I reformatted the hard drive, reinstalled Windows, installed Windows NT Service Packs 3 through 5 and then installed Firewall-1 and Service Packs 3 through 5 for Firewall-1.

About four and a half hours and 27 reboots later (this is Windows NT, remember) I was back where I was the day before. I still haven't gotten the batch job scripted, but I did make a copy of the \\winnt\fw\bin directory just in case I mess it up again.

This leads me into my next topic for this week: policies. I wrote a password policy along with a document on how to select a good password. I scoured the Internet for other people's policies and couldn't find one. There are books out there for \$500 that tell you how to write

a security policy and books that start at \$5,000 that contain actual policies. It seems that some sharing of knowledge would be helpful. If you have a security policy that you think I or others could use as a template, please e-mail me at [pat\\_rabbinski@hushmail.com](mailto:pat_rabbinski@hushmail.com).

## Mystery in the DMZ

I had a strange thing happen on Wednesday. At about 2 p.m., Web sites started timing out for no particular reason. Our team tried to ping nodes within our network. We got great responses, so we moved to the demilitarized zone between our LAN and the Internet, where our Web servers sit, and began testing our Web sites. We didn't find any problems there, either. Then we plugged a laptop into the four-port hub between our router and firewall. Again, no problems. So we opened up about seven command prompts and pinged away at three Web sites and about three routers deep into our Internet service provider.

I then opened up NeoTrace from NeoWorx Ltd. to continuously check the latency, or delays, on the path. We found that a router that was the first hop outside our Internet provider was having the problem, but employees at our provider said they found nothing wrong.

As you can see, being a security administrator can be time-consuming and tedious. You have to learn how to manage your time and projects. Sometimes I have to lock my door so I won't be disturbed or go to the lab so I can read a chapter of one of the great security books I purchased. Right now, I'm reading *Windows NT Security Handbook* by Tom Sheldon (McGraw-Hill, 1996) and *TCP/IP With Windows NT Illustrated* by Teresa Bisailon and Brad Werner (McGraw-Hill, 1997). The latter is a wonderful, well-illustrated view of TCP/IP. And by the way, the best computer-related book I've seen so far is *Hacking Exposed* (McGraw-Hill, 1999) by InfoWorld's Stuart McClure and Joel Scambray.

Next week, I'll tell you whether I ever got that simple log-switching .bat file to work. I'll also tell you about working with Plano, Texas-based Entrust Technologies Inc. to see whether its public-key infrastructure products will meet the needs of my "small" textiles firm.

Until then, remember this: Give less access to your network and more service to your clients. ▀

## THISWEEK'S GLOSSARY

**Batch file:** A file of commands that can be configured to run automatically at a specific time or under certain conditions.

**Demilitarized zone (DMZ):** An area between your LAN and the Internet where Web servers and possibly firewalls sit.

**Log files:** Files of information that record vital statistics about network or server performance.

**Router:** A device that routes data packets from one LAN or WAN to another.

**Firewall:** A network node that prevents traffic from crossing from one network segment to another.

## LINKS:

[www.securityportal.com](http://www.securityportal.com): Web site about security, featuring news, forums, reviews of products and more.

[www.neworx.com/neotrace](http://www.neworx.com/neotrace): Home page for NeoWorx Ltd. and its NeoTrace tool for detecting network problems.

[www.entrust.com](http://www.entrust.com): Web site for Entrust Technologies Inc., which makes tools for managing public-key infrastructures.

[www.computerworld.com/forums/index.html](http://www.computerworld.com/forums/index.html): Computerworld's forums page, with links to security discussions and resources.

<http://docs.ipplanet.com/docs/manuals/directory/41/admin/password.htm>: Netscape Directory Server Administrator's Guide from iPlanet E-Commerce Solutions. Find links to password policy parameters and information about configuring a policy and managing password and account lockout policies.

[www.microsoft.com/technet/winnt/winntsec/Planning/ntintsec.asp](http://www.microsoft.com/technet/winnt/winntsec/Planning/ntintsec.asp): A Microsoft TechNet article about designing and planning Windows NT internal security.

■ This journal is written by a real security engineer, whose name and employer have been disguised for obvious reasons. It's posted weekly at [www.computerworld.com](http://www.computerworld.com) and at [www.sans.org](http://www.sans.org) to help you and our security manager — let's call him Pat — better solve security problems. Contact Pat with comments or advice at [pat\\_rabbinski@hushmail.com](mailto:pat_rabbinski@hushmail.com), using "Pat's Journal" in the subject line.



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# STORAGE NETWORKING: BUSINESS *Drivers* for SANs

By John T. McArthur, IDC

**I**nternational Data Corp. defines storage-area networks as multiple storage devices connected to multiple servers through a switch or a hub. In a SAN, the storage network is logically isolated from the server network and the file systems exist within the application servers and not the SAN.

A separate logical network for storage traffic and a hub or switch distinguish SANs from server-attached storage. This private network also distinguishes SANs from network-attached storage (NAS), because NAS shares the server network. NAS also incorporates a file system, so to application servers on the server network, NAS appears as just another server.

SANs today are largely deployed in homogeneous server operating environments with a limited set of components that have been tested by the supplier for interoperability. SAN components may include host bus adapters, hubs, routers, switches, storage systems and SAN-management software. Standards haven't yet evolved to where users can select off-the-shelf SAN components and build a heterogeneous interoperable storage network. Today, each hardware microcode and software version release requires extensive testing for interoperability.

That said, a significant number of storage systems suppliers are certifying

server-attached storage as SAN-ready, meaning that the supplier warrants the storage system will comply with future SAN standards. In addition, heterogeneous SAN installations are increasing, as the tools to manage SANs in complex operating environments become more robust.

The business drivers for SANs today are primarily operational and have to do with scalability of capacity and performance, data replication, improved data access and improved application availability. But as SAN solutions evolve, SANs will become a key component to enable e-business.

## **Drivers for Storage-Area Networks**

SANs are born of necessity from a combination of operational, application, business and economic drivers. Rapidly declining storage pricing; continued growth of structured data; the expanding need to share information across applications, computing platforms and operating systems; the increased importance of unstructured data; and the limited supply of skilled IT workers are central to the need for storage-area networks. These factors, when combined with the need for an integrated storage and information management suite that works across applications, operating systems and platforms, provide a compelling requirement for storage-area networks.

## **E-Business**

Prior to the adoption of e-business as a distribution channel, transaction volume and sales growth were mostly controllable and somewhat predictable. In the age of e-business, companies have largely lost the ability to control either the timing or the volume of transactions. The challenges for retail Internet sites during peak holiday seasons and financial institutions that support Web-based trading have been well-documented in the press.

Companies must be able to adapt to unplanned growth, without employing the capital-intensive strategy of installing massive excess capacity "just in case." SANs offer nondisruptive upgrade capability that scales beyond the limits of any single storage system. More important, SAN software providers are delivering tools to nondisruptively allocate storage capacity to existing servers.

Unlike traditional transaction systems, Internet-based business-to-consumer applications must support both structured and unstructured data. In an Internet transaction, graphics-intensive Web pages are often combined with the output from several decision-support and data mart applications that enhance the buying experience and educate or guide the potential consumer. The I/O requirements of these various applications are too varied

to be supported by any single storage configuration. SANs can accommodate not only the varied workloads, but also can offer modular, scalable growth for each application.

Finally, e-business increases the need for continuous application availability. E-business initiatives have largely focused on time-to-market. Without a robust storage infrastructure and the tools to manage that infrastructure, however, application availability will suffer, putting the business at risk. Through data replication, alternate data access paths, nondisruptive upgrades and maintenance, and automated management, it is precisely this requirement that SANs were designed to meet.

#### Declining Storage Pricing

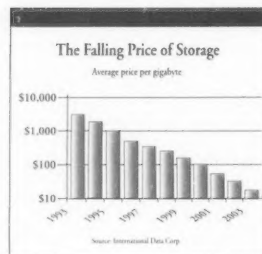
IDC forecasts that disk storage system pricing as measured in price per megabyte will continue to decline almost 40% compound per year through 2003. Among other factors, continued doubling of recording density of new hard disk drives every 12 to 18 months makes this possible. It's no wonder many users today view storage as almost free (see chart, this page).

Declining storage pricing has led to a proliferation of storage, but without a significant improvement in storage management efficiency, management costs will quickly overtake storage hardware costs.

#### Growth of Structured Data

For much of the prior decade, database applications were the primary consumers of storage capacity. As storage pricing continues to decline, companies have developed multiterabyte data warehouses and operational data stores for reporting and decision-support applications.

These information repositories may hold a year or more of atomic-level data from corporate transaction sys-



tems. In addition, transaction data may be merged with data from numerous outside sources.

#### Data Sharing

Historically, companies devoted massive amounts of energy to protecting and restricting access to corporate IT systems and the information they capture. As companies begin to realize the value of corporate information, they have built systems to share information. Rather than share a single copy of data with multiple applications, however, most companies seek to share information through data replication, in order to protect the source data from both intentional and unintentional corruption.

In many, if not most, situations, the applications that utilize the replicated data are hosted on servers of a different brand, different operating system with a different database. Therefore, there is tremendous demand for extract, transform, move and load (ETML) tools. Regardless, in all but the most highly integrated enterprise application suites, data-sharing requirements drive data replication and thus storage capacity use.

#### Growth of Unstructured Data

While the growth of structured data has been enormous, the growth of unstructured data has been even faster. E-mail and groupware applications such as Lotus Notes and Microsoft

Exchange have growing storage requirements that are, at best, difficult to manage. Many Notes and Exchange administrators initially try to limit storage capacity growth by encouraging or requiring users to archive or delete messages. These hapless administrators, however, quickly learn that the cost of having users, including temperamental executives, perform storage management tasks such as e-mail archiving is too expensive to be worth the bother. Those that take advantage of more aggressive application options that automatically delete older messages may find these choices to be career-limiting.

In the near future, storage capacity consumption will be driven not only by databases, e-mail and groupware applications, but also by more storage-intensive educational and entertainment applications that include massive amounts of audio and video content. These applications often require rapid restore capabilities to deliver the necessary quality of service.

#### How SANs Are Meeting Current Requirements

Storage can be segmented into two categories: internal and external. Internal storage is physically inside the server cabinet, while external storage is outside the server cabinet. In some cases, external storage may have a RAID controller card that is internal to the server, but the disk drives are external to the server cabinet. External storage can be further segmented into server-attached storage (SAS), network-attached storage (NAS) and storage-area networks (SAN). This broad range of options is necessary to meet the varied requirements of users today, and all these options will continue to be available for the foreseeable future. What's clear, however, is that networked storage, SAN and NAS, are the fastest-growing segments of the market today.

### Shareable Resource

Storage-area networks provide a centrally managed, shareable storage resource. By pooling storage resources for multiple servers, unutilized capacity can be allocated to any server that requires additional capacity. Though some server-attached storage can be shared among multiple servers, the number of servers is limited by the physical connections the storage system can support. In SANs, and in particular SANs that support fabric switching, the number of servers can be virtually limitless.

### Platform for Data Sharing

Recognizing that for the foreseeable future, most data sharing will be accomplished through data replication, SANs offer an ideal platform for data sharing. Through the promulgation of open standards and the ability to connect to multiple platforms and operating systems, SANs offer an ideal platform to deliver ETML function without impacting the local-area network.

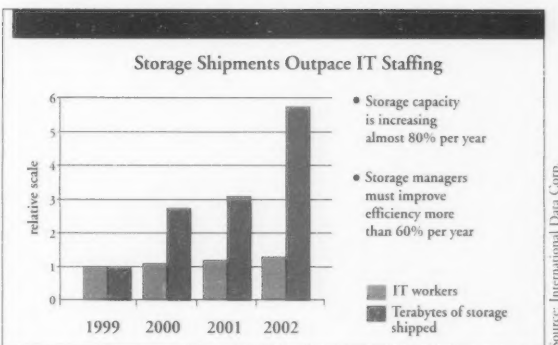
### Applying SANs Today

To the storage or network administrator struggling to keep up with the rising tide of data, the benefits of SANs may sound a bit too much like overhyped SAN nirvana. It is true that many of the expected benefits are months or even years away. But other benefits are available today.

### Mapping Storage to

#### Application Requirements

SANs today provide the ability to incorporate multiple storage solutions with different performance characteristics into a single storage pool. Applications that are throughput-intensive may benefit from one configuration, while applications that are update-intensive may benefit from another configuration. Applications with vastly different data access pat-



terns may reside on the same application server. By offering multiple storage solutions within a single pool, storage administrators can map application requirements to the most appropriate storage option. In the absence of a SAN, the option is often to choose a single "average" solution that isn't optimized for either workload.

Just as applications vary by I/O requirements, they also vary by availability requirements. SANs today provide an infrastructure for data replication as well as multiple paths to data. This capability ensures that data is always available. SANs also support clustered servers. With the extended distance capability (10km) and 100M bit/sec. performance of Fibre Channel, cross-campus and even metropolitan-area clustering is a real alternative.

### Backup and Recovery

LAN-free backup is the "killer application" for SANs in 2000. Open systems platforms, such as Windows NT and Unix, are often deployed without making adequate allowance for how the data will grow and how the data will be protected. Because many of the applications that reside on these systems support collaborative applications, such as e-mail, that span time zones, there is often no good time to back up data. Even "back-up-while-open" tools

are insufficient because the data is pulled over the LAN, thus degrading network performance.

In contrast to traditional backup methods, SANs offer a logically isolated, private network for backup. That means application and file servers can be backed up without impacting the LAN's performance. When used in conjunction with usable mirrors or virtual copies, data can be backed up without impacting application availability. Further, because of the throughput capabilities of Fibre Channel SANs, backups can often be completed faster than LAN backups.

While backups are the weekly, if not nightly, headache for IT managers, restore is the nightmare. Few IT managers believe they have the ability to completely restore an environment in the event of the rare site disaster. But even an isolated, single server or storage system crash represents a significant challenge from a restore perspective. Again, because of the superior throughput, data-replication and extended distance capabilities, Fibre Channel SANs are often the most logical platform for delivering both rapid backup and reliable, timely restore capabilities.

### Managing Exponential Growth

As illustrated above, the growth in storage capacity will significantly outpace

the growth of IT workers available to manage the storage. The amount of new storage capacity installed each year is increasing almost 80% annually. At the same time, the total number of IT workers is increasing approximately 5% per year.

From this, IDC estimates that in order to keep pace with growing storage capacity, storage managers must become 60% more efficient each year as measured by gigabytes per storage manager. The alternative is for firms to increase the percentage of IT staff devoted to storage management tasks.

At the same time, the cost to hire and retain storage managers will likely increase dramatically. IDC estimates that the number of unfilled IT positions will grow approximately 5% per year, reaching more than 1.6 million worldwide by 2002.

To compete for increasingly scarce IT resources, some companies have converted their data centers to profit centers. While this allows the companies to offer more competitive compensation, it will become increasingly difficult for data centers that operate as cost centers to hire and retain IT staff.

#### Need for Common Management Tools

Today's corporate computing infrastructure includes virtual islands of divisional, departmental and workgroup applications running on servers loosely cobbled together with corporate networks and legacy mainframe applications.

Larger companies may run three or more Unix operating systems, together with Windows NT, Novell, OS/390 and others. Outside the traditional

"glass house," network, database and system administrators often choose discrete applications for backup/restore, archive, hierarchical storage management, media management, disaster recovery, fail-over clustering and object replication. Storage system management tools for job scheduling, event monitoring and automated event handling are often not in use or support only a single operating environment.

#### Centralized Storage Management

Storage system, storage software and SAN infrastructure suppliers are making massive investments to deliver SAN software tools for managing shared storage resources at the logical, physical and even application level. Discovery tools will enable the storage administrator to recognize any device on the SAN. Other tools will provide simpler capacity planning, capacity allocation and system configuration.

Event monitoring tools will enable the storage administrator to detect conditions and take corrective action before they affect application performance and availability. SANs will also provide the platform over which storage software suppliers can eliminate the stove-piped applications and replace them with an integrated storage management suite. These advancements will enable users to achieve or exceed the 60% annual improvement in management efficiency that will be required. Storage management tools have traditionally focused on managing storage resources. Critical elements of management such as availability and performance management were viewed from the perspective of the storage device. When storage resources aren't

shared among multiple applications, this view may be sufficient.

However, as SANs enable shared storage resources, it becomes increasingly important that the SAN management tools enable the management of storage not from the perspective of the SAN, but rather from the perspective of the application. An application view of the SAN will enable the SAN manager to diagnose application problems down to the SAN component level and beyond. When combined with policy-based tools and intelligent automated management tools, these SAN management applications will convert the SAN to a performance-optimized, self-monitoring and self-healing storage resource for applications.

#### Where Do You Go From Here?

As with any new technology it's wise to start slowly. But it's also wise to start. To prepare for the benefits of storage-area networks, companies must organize for centralized control of storage resources. This isn't a trivial task, especially in companies with decentralized IT authority. Changes to budgeting and organizational structure may be required.

Whenever possible, users should physically consolidate storage to gain the advantages of better security and environmental controls. Existing storage should be inventoried by application type to determine the most appropriate storage pools. And finally, while it is important to get started, remain focused on SAN applications that can deliver a quick return today, while positioning for future benefits. ■

— John T. McArthur is director of IDC's Storage Systems Research group.



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# Apps Provide Lure For New Digicams

More pixels, better quality and a new generation of built-in software make digital photography better than ever. By Russell Kay

**Y**ES, YOU CAN GO ahead and buy one if you want to. That's my answer to one of the questions I'm asked most frequently as a reviewer: Is it time to buy a digital camera? The next question, of course, is, Which one? There's a magical and seemingly universal appeal to digital photography that other types of peripherals and digital gear just don't seem to have.

Today's best nonprofessional digital cameras are better than ever, with enhanced resolution, more flexible storage, in-camera image editing and file management and — as always — falling prices. In fact, digital photography seems to be obeying its own version of Moore's Law, with a correlation over time between an increase in quality and complexity and a decrease in price.

Two years ago, state-of-the-art digital cameras cost about \$1,000 and had a 1-megapixel

capability. That meant photos could be made up of more than 1,000,000 pixels, often expressed as a resolution of 1,200 by 900 or so. A year later, the top-end machines were still available for \$1,000 but had a 2-megapixel capability, and the previous year's top-end machines had been reduced in price by about 35%.

Now we see top-end cameras with resolutions of 3.3 megapixels. Their price tags are around \$1,000. Last year's best are selling for \$600, while the 1-megapixel machines from two years ago are in the \$300 range.

I recently took a look at several digital cameras and found many that I can wholeheartedly recommend.

Perhaps the sleeper of the bunch, with the least-interesting appearance, is the user-friendly RDC-5300 from Ricoh Corp. in West Caldwell, N.J. It's a great value, priced at \$650 or less. In terms of specifications, it doesn't read much different from the 2-megapixel C2000 from Melville, N.Y.-based Olympus Image Systems Inc., which I recommended last year. However, it's easier to use, it's smaller and it has one feature I really

like: a sliding cover for the LCD display on the back. When you're not using it, the LCD is out of the way and protected, and you know it's turned off. It's a small touch, but a really worthwhile one that I wish other manufacturers would copy.

Another camera I like a lot is the MDR-5 from Toshiba America Inc. in New York. The MDR-5 is similarly priced and has similar specifications and features. It has a shape reminiscent of a compact single-lens reflex camera that makes it especially easy to handle.

Finally, the top-of-the-line DC290 from Rochester, N.Y.-based Eastman Kodak Co. is a camera whose basic 1,792- by 1,200-pixel resolution can be interpolated up to 3 megapixels to 2,240 by 1,500. This level of detail really compares well with that of any film camera, at least with prints up to 8 by 10 inches. Introduced last fall at \$999, the price has recently been shaved by \$100.

However, the biggest technology story lies in the cam-

camera's compact flash-memory card. These programs can be used to do several things, such as build Web pages and image databases and create fliers and other types of documents directly in the camera; guide the user to take certain



**THE DIGITA operating environment, seen here on the DC290's LCD, lets the camera perform more functions and operations**

types of images; reset camera default settings; automate the placement of logos, time and date stamps, and watermarks; and much more. You can upload images to the camera or a compact flash card, which will enable you to use the camera as a self-contained presentation device that uses its own tiny LCD screen or hooks up to a television.

As with any operating system, there's a developer community, a software developer's kit for creating applications and several Web sites from which you can purchase or download scripts for your Digita-enabled camera. The best starting point I found is [www.flashpoint.com](http://www.flashpoint.com).

Add-on packages such as Digita FX allow you to perform image editing, color correction and other modification operations right in the camera. Of course, the typically tiny 2-in. LCD screen is a limitation, but most cameras have a built-in digital zoom that lets you magnify a section of a photo to see it better.

So far, the following cameras are Digita-enabled: Kodak's DC220, 260, 265 and 290; Hewlett-Packard Co.'s Photo-Smart C500; and Japan-based Minolta Co.'s Dimage EX 1500. In addition, Torrance, Calif.-based Epson America Inc.'s PrintOn PT100 photo printer uses Digita, which enables it to template, filter, resize or reformat photographs before printing, without connecting to a PC.

All in all, now is a good time to think about getting started in digital photography. ■



**THE RICOH RDC-5300 has a simple, compact design and is a great value in today's market**



**THE KODAK DC290 can take its sensor data and interpolate it to more than 3 megapixels**

era's software. The DC290 is among the first crop of cameras to make full use of Digita, a brand-independent operating environment from San Jose-based Flashpoint Technologies Inc. that was specifically designed for digital cameras and other imaging devices such as scanners and printers.

## An Operating System for Imaging

You may wonder what an operating system for imaging is. I did, the first time I encountered the idea. With a well-defined operating system base, it's possible to create programs that will extend the features and functionality of these cameras.

Using the Digita Script programming language, you can create scripts on a PC that can then be downloaded to the

# File Transfer Protocol

BY SAMI LAIS

**F**ILE TRANSFER protocol (universally known as FTP) is a remarkable term: It's both noun and verb, protocol and application, client and server (daemon).

FTP, developed in 1969 by the Department of Defense's Defense Advanced Research Projects Agency, is a standard for moving files across IP-based networks such as the Internet. Based on the TCP/IP protocol, FTP is platform-independent, which makes it possible for different computers running different operating systems to exchange files.

Text files are, by default, sent in ASCII format. The client, or sending computer, converts the data into 8-bit ASCII format. The server, or receiving computer, converts the ASCII text into a format appropriate to its hardware

and operating system. Images and other nontext data such as compiled programs are sent as binary data, using 8-bit bytes.

Typically, FTP files are compressed. They can be self-extracting, or you may need to use a program such as PKZIP to uncompress them.

A user contacts a server via the FTP client, establishes a connection, logs on to the network, requests directory listings and copies files. This can be done by typing commands or via an FTP utility running under a graphical user interface such as Windows.

## Rules of Engagement

One variation of FTP is Trivial FTP, which has no directory or password capabilities. However, the most popular form is Anonymous FTP, which is dependent on the server configuration. When the FTP server is contacted, it asks for a user

name and password. Users log in as "anonymous" and can access files on the server. By convention, users input their e-mail address as the password.

Typically, users can download files but are unable to upload, change or delete them. If some users must be given those rights, the usual procedure is to set up a separate upload directory to maintain the security of the download section.

For example, if your Web site is hosted by an Internet service provider, you might FTP Web site updates to such a directory. The Internet service provider would retrieve the updates from that directory.

Without a firewall that provides authentication and privacy via virtual private networks, password-protected FTP is useful only for files of minor importance. Between client and server, FTP passes user names and passwords in clear

text, which can easily be stolen.

As an application, FTP is typically built into communications software, which supports other common file transfer protocols, such as Xmodem, Ymodem, Zmodem and Kermit.

Xmodem, which transmits 128-byte blocks, was the first FTP for PCs. It performs a checksum on packets to help ensure accurate transmission. The sending computer uses an algorithm that calculates the binary values in a packet and sends the result as a tail on the packet. The receiving computer goes through the same algorithm. If the two sums match, then it's fine; if not, it requests that the packet be re-sent.

Ymodem, which transmits 1,024-byte blocks, adds batch file processing to Xmodem.

Both are stop-and-wait protocols. The sending computer transmits, waits to receive an acknowledgment, or ACK, from the receiving computer that the packet was received intact. A negative acknowledgment, or NAK, indicates a bad or missing packet and requests that the sending computer re-send the packet.

Zmodem is a streaming protocol. The sending computer keeps sending packets until it gets a NAK. Then it backs up to the bad packet and re-sends from there.

Zmodem also adjusts packet size, depending on line conditions. If transmission is interrupted midtransfer, Zmodem can restart and resume sending from the point at which it was interrupted. It's often used for satellite transmissions because of its ability to handle changeable line conditions.

Kermit was developed in 1981 at Columbia University. When it breaks a file into packets, each packet is bracketed by control data. The receiving computer checks each packet's control data as it arrives and sends an ACK or NAK, as applicable, to the sending computer.

The default communications protocol for the Web, Hypertext Transfer Protocol (HTTP), is used to transmit HTML

## Sometimes Old Ways Are Best

More than 30 years after it was developed, FTP is still the most efficient way to download large files over the Internet.

Want a map that shows the habitat of every vertebrate and plant, as well as the latitude, longitude, elevation, rainfall, temperature range and climate of the Grand Canyon? The U.S. Geological Survey (USGS) in Tucson, Ariz., uses a single Unix box to provide the data sets that create such multilayer maps and then FTPs the final map to the requesting computer.

Why does the USGS use FTP? There are several reasons:

■ **It's small.** FTP was designed to send and receive files without encoding and decoding the data. To attach and send a graphics or map file using an e-mail program, it must be encoded. If a mail gateway at the receiving end limits the total length of an e-mail message, it will break up the file and send the pieces, which must be manually recombined.

■ **It's fast.** Because you send FTP directly, it doesn't need the extra processing "weight" of the messaging applications needed when you send a file by attaching it to an e-mail message.

■ **It's simple.** All you need is a PC with modem and Web browser, plus a phone line. Initiate the FTP transfer from within your browser. It's as easy as typing ftp:// and then the Web address.

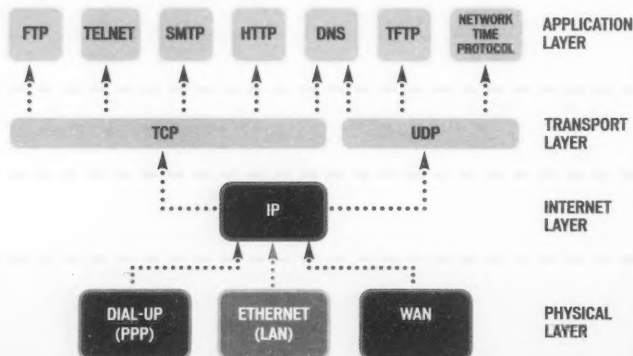
■ **It's reliable.** Got "noisy" phone lines? It doesn't matter. When the computer on the receiving end of an FTP transfer reassembles the file, guided by each packet's number, it checks for lost packets. If any are missing, it signals the sender to re-send them. — Sami Lais

## DEFINITION

**File transfer protocol** is a standardized method for sending unencoded binary files over IP connections. FTPing a file is more reliable than other methods, such as sending it as an attachment to an e-mail. The sending computer breaks the file data into numbered packets. The receiving computer uses the numbers to reassemble the packets in the right order.

## Internetworking Model

Where FTP fits within Open Systems Interconnection



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As our readers' thoughts turn to Windows 2000, so do we. Our editors are now Windows 2000 Advantage (formerly Windows NT Advantage) and we keep pace with our reader community we're sharing a full slate of case studies, feature stories, and perspectives. Windows 2000 features (continued)

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# Fighting THE NETWORK STORAGE FLOOD

To manage server space, IT can police it, use new storage resource management tools, or both. By Elizabeth M. Ferrarini

**A** LINE IN CHARLES DARWIN'S *The Origin of Species* — "Man will use all the space he can" — provides a good description of the network storage groundswell caused by employees' system use. And information technology departments that buy additional disks willy-nilly to cope with multiplying megabytes won't have any more success than if they tried to ward off a flood by carrying away buckets of water.

"Wanted" posters for unruly storage growth could target Windows NT servers as prime suspects, according to some observers. Michael Adams, a storage analyst at Giga Information Group Inc. in Cambridge, Mass., says, "It's common for Windows users to create massive amounts of data by downloading and storing Web files on a server or by copying the entire contents of a PC onto the server."

Windows' crude file-naming schema makes it difficult to locate files and remove them, he adds.

Organizations, from Fortune 500 companies to small businesses, can look forward to an overall increase in the number of servers they use







MARK MOONEY, chief technology officer at Houghton Mifflin, suggests that "you need to educate employees nicely about how to manage their network storage."

and capacity per server, regardless of the operating system. Santa Barbara, Calif.-based Strategic Research Corp.'s "1999 Network Demographics" report says that from 1997 to 2003, a typical site's total server capacity will grow at an annual rate of 44%, while the average capacity per server will increase 31% per year. By 2003, the average site server capacity could exceed more than 1.2 terabytes.

On the flip side, Strategic Research's report says the capacity per site and the number of systems administrators needed to manage that capacity will grow by 50% annually. It also suggests that a typical systems administrator could manage about 200GB of network storage.

What will it cost to manage all this? John Webster, a storage analyst and IT adviser at Illuminata Inc. in Nashua, N.H., says the cost of managing data per megabyte can range from five to 10 times the cost of the physical storage medium. He adds that "some IT departments have lost control of their costs, and even what's on their networks."

How can an IT department put a lid on network storage so systems administrators won't have to worry about crashing servers and disk-devouring employees? Organizations such as Houghton Mifflin Co. and office-supply superstore chain Staples Inc. have put in place IT storage policies that, in some cases, have become part of corporate computer usage policies.

Such policies can define what gets placed on a server, how much space each employee is assigned on a server and what kinds of housekeeping tasks employees will be asked to carry out if they exceed their space allotments.

Mark Mooney, chief technology officer at Boston-based textbook publisher Houghton Mifflin, says that at the root of the problem is the amount of discipline required by people using the systems. "You need to educate employees nicely about how to manage their network storage," he says.

### New Tools

To accompany that discipline, there's a new class of storage management tools, called storage resource management (SRM). These tools provide IT departments with the ammunition to justify a policy, put the policy in place and carry it out painlessly. SRM encompasses centralized, detailed monitoring, alerting and reporting functions, as well as the tending of specific storage resources, such as disk partitions and files and the data stored on them in a networked system.

In the prospectus "Storage Management Software Expands Beyond Backup/HSM," research firm Dataquest in San Jose forecasts that SRM products will catapult from \$210 million in sales in 1997 to \$1.4 billion by 2002.

*Continued on page 78*

## Fighting THE NETWORK STORAGE FLOOD

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The need for any type of IT storage policy can create angst among employees. Webster says IT departments must present the policy in such a way that employees grasp the rationale for it.

"They need to understand that managing storage has nothing to do with the cost of the media," Webster says. "Instead, it's about safeguarding their information and making it readily available to them without interruptions."

During the next three years, the number of Windows NT servers in use will grow by 85%, according to Farid Neema, a storage consultant at Peripheral Concepts Inc. in Santa Barbara, Calif. He adds that organizations with hundreds, if not thousands, of Windows NT servers will make good candidates for corporate storage policies and will invest heavily in SRM tools.

"Using these tools, systems administrators can set space limits and unobtrusively monitor at what rate that space is being used, who is using it and how much they are using, who has taken noncompany liberties with their space and what strategies to take to get it under control," says Neema.

With islands of disparate Windows NT servers, the IT department at one major telecommunications company is developing corporate storage management policies and is in the early stages of testing storage management tools. An IT analyst at the company currently tracks storage usage on 17 servers that each serve about 1,000 employees, out

of about 1,000 servers for more than 50,000 employees. The proposed policy would specify what types of files, such as music and executable programs, don't belong on servers and would set the length of time documents can be kept on the server before they must be deleted or archived. The IT organization works with an existing corporate compliance group to extend the current document retention policy so that it applies to computer files as well as to paper-based information.

Most of the IT analyst's work consists of determining the best way to set space allocations in a mature Windows NT environment. "We decided to assign space allotments to groups of individuals and monitor that space," he says. Some groups may have 250MB for all their members, while other groups may only have 500MB for all members."

If all goes as planned, Reston, Va.-based W. Quinn Associates Inc.'s QuotaAdvisor will allow the analyst to set thresholds on specific space allotments per group, based on a number of attributes, including files, directories and disk drives. Whenever someone comes close to exceeding his space allotment, the user will receive an on-screen message from QuotaAdvisor that tells him to remove some documents. QuotaAdvisor can be set up to padlock the write privileges of employees who exceed their quota and don't free up space.

To make it easy for employees to manage their space and keep calls to the IT department to a minimum, the IT analyst plans to use W. Quinn Associates' DiskAdvisor in conjunction with QuotaAdvisor. DiskAdvisor will allow the analyst to run several real-time reports that are built into the product, such as a listing of duplicate files across different directories or a listing of files with specific extensions.

"If someone wants a larger directory space, we can run a report on their disk drive and point them to files they may want to delete or archive.... We'll soon be able to send them the DiskAdvisor report as a Web page. This way, they can automatically delete the files," the analyst says.



He plans to use another W. Quinn product to put a padlock on the specific types of files that don't belong on the server.

Meanwhile, large network outsourcing organizations may soon realize the value-added service in helping their customers carry out a storage policy by using SRM tools.

### Balancing Storage Space

When it comes to storage policies, some organizations adhere to a friendly union of church and state. The corporate storage policy outlines what types of files employees can store on servers and desktops. Likewise, the IT department acts as a watchdog for the corporate policy and, at the same time, carries out its own space usage policy. That's how Framingham, Mass.-based Staples enforces its storage policies. In fact, Staples' corporate storage policy, which covers Internet use, says that employees must use their server directories for business documents only. As an adjunct to this policy, each IT group within the



**You have to accommodate any future storage needs [users] might have.**

HELEN FLANAGAN,  
WINDOWS NT SYSTEMS  
ADMINISTRATOR, STAPLES INC.

company assigns employees in specific departments a flexible amount of personal space on the server. Either way, the IT departments use SRM tools to clip storage growth before it turns into a paper tiger.

Continued on page 80

## Making a Storage Policy a Best-Seller

Pressure to contain corporate spending last year, combined with Lotus Notes servers that had reached 95% capacity, motivated Mark Mooney to put a Lotus Notes storage policy in place at textbook publisher Houghton Mifflin.

"Ten percent of all corporate spending goes for storage - everything from buying equipment to maintaining it. Since we didn't know what fueled storage growth, we didn't have a systematic way to budget for storage," says Mooney, Houghton Mifflin's CTO.

Meanwhile, systems administrators feared that several Lotus Notes servers could crash if

stuffed beyond their limit. For weeks, employees had been complaining about the snail's pace of e-mail via Lotus Notes and the slowdown of the search capability within the Notes database.

"With 2,500 employees using Lotus Notes for everything from e-mail to databases to collaborative sharing, we should've been doing a better job watching storage growth on these servers," Mooney says.

A central group of IT systems administrators, assisted by local systems administrators, found two consistent usage problems on Sun Micro-

systems Inc. and IBM servers. First, employees in one division archived documents to Lotus Notes servers, not the archive server. According to Mooney, there was confusion about the proper server for the most current version of a manuscript. Second, editors were saving all versions of book chapters as both e-mail attachments and documents.

Mooney's proposed Lotus Notes strategy provided a practical measure for first freeing space on the clogged servers and then containing storage growth on all Notes servers. But once word of the policy got out, he says, "editors I had never met called and said complying with a storage policy would bring them to a grinding halt."

The biggest hurdle consisted of getting editors to alter the way they worked. Exchanging chapters freely with authors and freelance editors via e-mail is part of Houghton Mifflin's standard procedure for producing a book.

With the support of Houghton Mifflin CEO Nader Darehshori, Mooney organized a steering committee that included business managers from each division. "We sent employees an all-hands memo signed by the CEO," he says.

Each department met to discuss the memo. The IT department, with assistance from the business managers, sent lists of file names to editorial groups throughout the company. The editors were asked to either delete the files or

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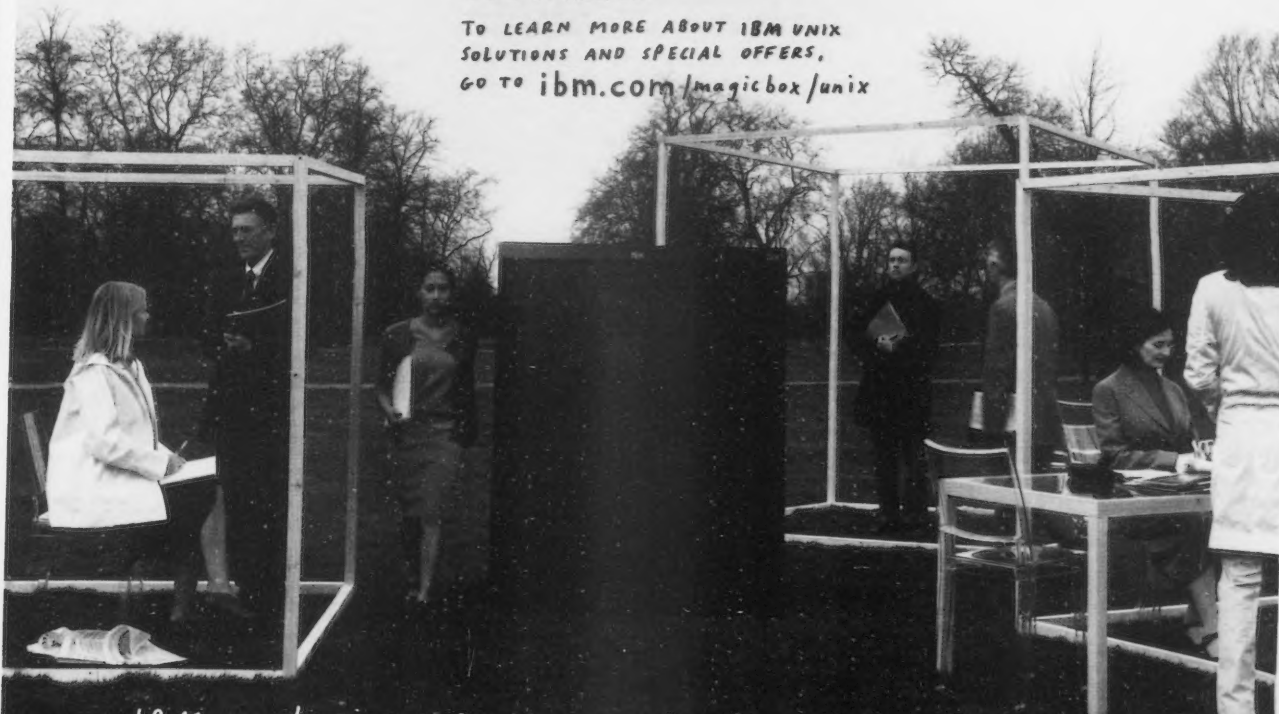
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# Fighting THE NETWORK STORAGE FLOOD

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Helen Flanagan, a Windows NT systems administrator at Staples' corporate office, uses Marlboro, Mass.-based HighGround Systems Inc.'s Web-based Storage Resource Manager across 75 servers to look at historical space reports, based on attributes such as servers, directories, partitions and users. Storage Resource Manager also allows her to set thresholds on several storage attributes, such as disks, partitions and users, and get alerts if those attributes get near or bypass a threshold.

"Sometimes, people will forget to delete log files or manuals," she says. "The alert allows you to talk with them about their storage."

Flanagan says she often gets caught in the middle of trying to take preventive measures to reduce storage and, at the same time, help accommodate individuals who require more space. "Some people are so busy they don't have time to remove files," she says. "Others get themselves wrapped up with what's-needed-and-not-needed stuff. For example, the legal department has certain ideas of what it should keep on the server."

Flanagan adds that giving all employees the same amount of space seems more suitable for an environment where a lot of users perform one specific function. But for a growing environment, she says, you need to identify and talk with individuals about their storage needs. "Perhaps someone has a different requirement than you initially

considered. You have to accommodate any future storage needs they might have. These things are key," she says.

Even with corporate storage policies or an IT storage policy, a systems administrator may need to take out the SRM handcuffs and clamp them on space hogs.

## Drastic Measures

John Moeller, a Windows NT administrator at Agfa Corp., a Ridgefield Park, N.J.-based photographic and electronic imaging systems maker, has worked diligently to curb network storage abuses at Bayer Corp. in Charleston, S.C. In fact, Moeller, who works on-site at Bayer, which owned Agfa until last January, suffered a server crash when an employee decided to back up an entire desktop database to the server.

"When I came back from lunch, the server was down because someone had taken up 100MB of space," he says. The company's corporate computer policy outlines what types of information employees can store. Each IT group decides how it will oversee network storage.

Moeller uses Boston-based Astrum Software Corp.'s StorCast SAM, a space monitoring and alerting product that's similar to W. Quinn's QuotaAdvisor, to make sure employees stay within their 40MB allotment. When an employee hits 20MB, StorCast automatically sends him a message about the need to remove files and continues to send notices until the employee fulfills the request.

Once the server space reaches the 40MB limit, the employee won't be able to store any more files on the disk because of the padlock placed by StorCast. The employee then has to free up space or call the IT department.

Although this might sound like a drastic measure, Moeller says, "You can store a lot of spreadsheets and never get beyond 20MB. If you start downloading games, then you'll quickly fill up your space."

Moeller says the most common space abuses on his five Windows NT servers include downloading games and

streaming attachments via e-mail. Moeller says games don't belong in the workplace, and he makes sure employees delete them. "Employees have to realize corporate use determines how disk space is to be shared," he says.

An organization's need to set and carry out IT storage policies may not fuel all SRM sales. However, the need for SRM tools has definitely caught the eyes of some heavy hitters in the past few months. The seeds these organizations are now sowing could produce a bumper crop of SRM products.

Hopkinton, Mass.-based EMC Corp. paid about \$192 million for Softworks Inc., a 20-year MVS storage performance management company in Alexandria, Va. Softworks' CenterStage, one of three SRM products the company offers, will soon step into the spotlight adorned with more features for reclaiming unused storage resources across multiple operating systems. EMC also paid \$23 million for Needham, Mass.-based Teraspace Software Inc., a 2-year-old start-up with SRM products for Oracle environments.

Investments in HighGround Systems include \$20 million from Houston-based Compaq Computer Corp. and a few million from Legato Systems Inc. in Palo Alto, Calif. Watch for beefed-up SRM product announcements from Veritas Software Corp., BMC Software Inc. and Sterling Software Inc., which were recently bought by Computer Associates International Inc.

And don't forget that Microsoft Corp.'s Windows 2000 comes with some SRM capabilities to monitor space allotments. Manchester, N.H.-based NTP Software, which markets an SRM product called Quota Manager, provided the code for Windows 2000.

Remember also that although network storage can be kept within reasonable limits if you implement the tools available and impose storage policies, the key to success is persuading employees to use those tools and follow those policies. ▀

*Ferrarini is a freelance journalist and the author of several computer books.*



**Employees have to realize corporate use determines how disk space is to be shared.**

JOHN MOELLER,  
WINDOWS NT ADMINISTRATOR,  
AGFA CORP.

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## Storage Policy

archive them on a desktop PC. The IT department also met with employees to examine their storage needs.

Houghton Mifflin's network storage policy, which became part of a corporate policy for computer and telephone use, gives each employee 100MB of e-mail file space in Lotus Notes. The space allotment is tracked by BMC Software's Resolve SRM suite. When a user exceeds his allotted space, the IT department sends him an e-mail message. Senior executives who exceed their space also get a tele-

phone call from the IT department. The policy outlines a variety of other storage procedures, such as where to store images.

A few weeks after putting the policy in place, Mooney says, the capacity on most of the Lotus Notes servers had shrunk to between 70% and 80% of capacity. "We also stayed well within the margin for our budget as a result of not buying more servers [for storage]," says Mooney.

To date, he says, about 300 employees have exceeded their space allotment. "Most of these are financial people who work with spreadsheets, as well as a lot of executives," Mooney says.

He says employees have learned to manage

their space because they now realize that storage costs money. "If employees require more space, then we have to look at why and accommodate their needs," he says.

To free 15% of available server capacity, all Houghton Mifflin had to do was implement a storage use policy, get staff accustomed to the idea, use the capacity-tracking utility and gently enforce good usage habits.

The hardest part was getting people to cooperate and to follow a procedure. Without support from the CEO, Mooney says, he wouldn't have been able to accomplish much, because he wouldn't have had the clout to persuade employees to cooperate.

*—Elizabeth M. Ferrarini*



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Registration

7:00pm - 9:30pm

Pre-Conference Networking Reception

### Monday, June 19, 2000

8:30am - 9:00am



**Welcome and Opening Overview**  
Maryfran Johnson, Editor-in-Chief  
Computerworld

9:00am - 9:45am



**Opening Keynote: "IT Leadership vs. E-Leadership"**  
Charlie Feld, E-Leader and former CIO, Delta Airlines  
CEO, The Feld Group

10:00am - 11:30am



**"The Naked Truth About B2B E-Commerce"**  
Kevin Fogarty, Business Editor  
Computerworld

Moderator:

Panelists:  
Robert Schwartz, VP & GM  
Parasoft Corp.  
Kathy Brittain-White, CIO & FVP  
Cardinal Health (cardinalhealth.com)  
Peter Ruzarsky, CTO  
Reebok International  
John Kasch, CIO/CTO  
Networks

Everybody's talking about business-to-business collaboration as the hottest of the online trends in 2000. But many feel this emperor still has no clothes. This panel will cut through the hype surrounding e-marketplaces, answering some critical questions on the benefits versus the risks. Should your company participate in someone else's B2B marketplace or create your own? When and how do you measure ROI when you're executing at Internet speed? There are multiple decision points for entry into Web-based collaboration, including infrastructure concerns, business application readiness and trust issues between trading partners. As these new business and organizational models evolve, what are the key factors your company must consider? Can it really promote higher sales or lower your production costs? IT leaders from several industries will share their successes and candidly discuss the pitfalls of B2B e-commerce in this interactive session.

11:30am - 12:15pm



**Insider View: "Raytheon Corp.'s Unfolding E-Business Strategy"**  
Eric Singleton, Director of Global E-Business  
Raytheon

12:30pm - 1:45pm

Interactive Luncheon with IT Leaders

2:00pm - 3:30pm



**"Enterprise Security: Will Only the Paranoid Survive?"**  
Priscilla Tate, President  
Technology Managers Forum

Moderator:

Panelists:  
Scott Cherny  
Senior head of computer crime  
investigations, U.S. Department  
of Justice and now Partner  
PricewaterhouseCoopers  
Allen Peller  
Columnist, Computerworld  
and Research Director, ISANS  
Tim Tabor  
VP of Technology Management  
P&H Vehicle Management  
Services

The costs of electronic attacks and security breaches are rising sharply, more than doubling each year into hundreds of millions of dollars. Every week, it seems, a new high-profile victim joins the list of companies that failed to protect themselves and their customers. Never have the business imperatives of secure commerce been so prominently in the spotlight. For IT leaders, the issues go beyond technical concerns. What are your company's legal liabilities when customer data is compromised? How do you get past political wrangling over budget allocations for security products? What are the questions you should be asking inside your own company - or of your outsource or suppliers? This session will explore enterprise security in depth, drawing out examples, ideas and action items from our expert panelists.

3:30pm - 4:15pm



**Afternoon Keynote: "Innovation & Change"**  
Thornton May, VP of Research  
Cambridge Technology Partners

4:30pm - 5:30pm

Sponsor Breakout Sessions 1 and 2

5:30pm - 8:30pm

Expo Open and Reception/Buffer Dinner

### Tuesday, June 20, 2000

8:45am - 9:00am

Remarks and Day Two Overview

9:00am - 9:45am



**Keynote**  
David Lord, CEO  
Toysmart.com

10:00am - 11:30am



**"ASPs: The Double-Edged Sword of Outsourcing"**  
Mark Hall, West Coast Bureau Chief  
Computerworld

Moderator:

Panelists:  
Dick Hudson, CIO  
Global Marine  
John Wootler  
CIO, CTO & SVP  
Black & Veatch  
Sateesh Loh, President  
Loh Consulting Group

This latest trend is both an option and an obstacle. As the application service provider market grows beyond the small to medium business space to take advantage of enterprise-class software, IT leaders are considering ASPs as a serious tool in their technology strategies. Yet will these outside vendors offer sufficient security for your IT operations? Can you control point product offerings from ASPs? How do you insure that ASPs deliver on service level agreements? Will today's high-flyers crash to earth and take your company with them? This panel session will nail down the critical success and failure points, and answer the most pressing and provocative questions that ASPs raise for IT executives.

11:30am - 12:15pm



**Featured Speaker**  
Peter Slovik, CIO  
Cisco Systems

12:30pm - 2:00pm

Buffet Lunch and Expo Open

2:00pm - 3:30pm



**"Walking the E-Customer Tightrope"**  
Julia King, Senior Editor  
Computerworld

Moderator:

Panelists:  
Cathy Hoke, VP  
National Retail Federation  
Joseph Smolenski  
Vice Chairman  
First Boston Financial  
Robert Rubin, CIO  
EB Maclean North America

Technologies such as data mining and customer relationship management software can put your company right in its customers' pockets, not only anticipating their current needs but discovering new ones. But where does e-business cross over that line between customer knowledge into invasion of privacy? Does your company know how to walk this tightrope without falling off? What are the best strategies for leveraging and managing high-impact business data without alienating customers along the way? How are leading companies using technology to sustain old relationships while developing lucrative new ones? Does online customer service differ from the traditional approach? This panel session will explore the positives and the perils of the customer connection.

3:30pm - 4:15pm



**Insider View: "Taking Care of E-Customers at Autobytel"**  
Ann Delligatta, COO  
Autobytel.com

4:15pm - 4:45pm

Premier Sponsor Breakout Session 3

4:45pm - 6:30pm

Expo Open and Reception

7:00pm - 9:00pm



**Premier 100 Awards Presentation and Gala Dinner**  
Featured Keynote: Jim Yost, CIO  
Ford Motor Company

### Wednesday, June 21, 2000

8:45am - 9:00am

Remarks and Closing Day Overview

9:00am - 10:30am



**"How to Win the Hiring War Between the 'Dots' and the 'Nots'"**  
David Weldon, Careers Editor  
Computerworld

Moderator:

Panelists:  
Irene Cho, VP of International  
Investments, Prudential Insurance Co.  
Margaret Schaefer, HR Director  
Kraft Foods  
Robert Bruce, CIO, Ameriica Financial  
David Foster, Managing Partner  
Foster Partners LLC  
Jim Press, CIO, Green Mountain Coffee

Many traditional companies are reeling from the impact of the dot-com drizzle, as so many startups pull top talent from their employee ranks. Beyond the stock options and the thrill of new ventures, what are dot-coms offering that your company may be overlooking? Are you talking about career development, or droning on about employee retention? How can you "steal" from your own staff in other divisions to enrich and strengthen the technology operation? What kind of employee referral programs really work? We'll hear from both sides of the debate in this lively, provocative discussion of hiring, head-hunting and holding onto the best IT people in a sizzling job market.

10:30am - 11:15am



**Closing Keynote: "Putting All the Pieces Together: The E-Management Difference"**  
Peter Keen, Author, *The eProcess Edge*, and Chairman  
Keen Education

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# Breathing New Life Into Old E-Mail

*Creating messages is a collaborative effort with start-up FireDrop Inc.'s Zaplets*

BY LEE COPELAND

THE REPUBLICAN National Committee (RNC) wants to keep its finger on the pulse and purse of its membership as the campaign for the U.S. presidency heats up this summer. This year, however, the staff is adding to its usual mail and phone marketing efforts; it will deploy Web-based communications to initiate funding drives, test advertising campaigns and get feedback on key political issues.

Even better, the RNC will be using FireDrop Inc.'s Zaplet communications platform to send out its e-mail missives, says Larry Purpuro, deputy chief of staff at the Washington-based RNC. That's because Zaplets add interactive capabilities to e-mail.

"Static e-mail is dead on arrival," says Purpuro. "We hope that people will react to an e-mail, [but] there's very little way to judge the open rate and no way to measure the response in real time. Also, if we send someone a banner ad, are they going to type out a formal response and send it back, as opposed to using useful buttons and response devices [within the e-mail] that make it an easier form of communication?"

## Hybrid Application

A hybrid of e-mail, instant messaging and Web-based collaborative tools, a Zaplet arrives via e-mail but allows recipients to interact directly with the content.

A polling Zaplet could allow the recipient to cast a vote on a particular issue from the e-mail and offer a real-time accounting of how other voters have responded to the query. It also could report back to the sender how many recipients have opened the e-mail and allow recipients to forward the message to others, who would also

be included in the poll.

David Roberts, the president of FireDrop, says a Zaplet that aggregates all replies is ideal for corporate service departments in addressing customers' problems.

As opposed to "ping-pong-ing" blind messages between

departments, one e-mail would contain all the relevant replies.

"Seven people could be talking to the same customer, but the customer only gets one message, and the company knows everything that's being said in the background," Roberts says.

"We're going to see if it's useful in testing ads and in building issue-based dialogues with our activists," Purpuro says. "The idea that we could e-mail 50,000 donors and ac-



DAVID ROBERTS, FireDrop's president, says he began tinkering with collaborative e-mail designs to plan a weekend away

## FireDrop Inc.

**Location:** 3000 Bridge Parkway  
Redwood Shores, Calif. 94065

**Telephone:** (650) 620-2900

**Web:** [www.firedrop.com](http://www.firedrop.com)

**Niche:** Residing on top of e-mail, Zaplets applications can be created for a variety of tasks such as scheduling, discussing and polling.

**Pricing:** Free for consumers who join MyZaplets; \$5 per business user, depending on application

**Why it's worth watching:** With a unique communication tool that converges the Web, e-mail and instant messaging, FireDrop can build a consumer user base through its free Web service and leverage that stake in the corporate market.

**Number of employees:** 120

### Company officers:

- David Roberts, co-founder and president
- Brian Axe, co-founder and vice

president of platform products

• Samir Mitra, general manager of e-business solutions

### Milestones:

- August 1999: Company is founded
- April 2000: Zaplets communications platform is available

**Customers:** Republican National Committee in Washington and GreaterGood.com in Seattle

**Burn money:** \$5 million from Kleiner Perkins Cautfield & Byers and \$7 million from Comdisco Ventures, both in Menlo Park, Calif.; additional funding from individual investors

**Red flags for IT:** Although useful for getting instantaneous reactions from recipients, most companies already have Web-based applications and sites deployed for interactive communications. Many may want to use other real-time applications that offer a greater range of collaborative features.

tivists a question or sample banner ad to get their immediate direct reaction — and measure that reaction in real time — is exceptional."

Roberts and Brian Axe founded FireDrop last August. The Redwood Shores, Calif.-based company's Zaplet communications platform will be available this month.

Roberts is an MIT-trained Harvard MBA and former Air Force captain and Central Intelligence Agency officer. He says he began toying with the Zaplet concept to organize a weekend getaway. "Telephone and e-mail may not work well for collaborative kinds of problems, but we looked at the reality of the convergence of the Web, e-mail and instant messaging and realized there were a lot bigger problems in the world to solve other than trying to create a way to schedule a weekend with friends," he says.

FireDrop has created disappearing Zaplets that self-destruct after an allotted time period, discussion Zaplets that let team members discuss résumés and Zaplets to group messages on a given topic.

## Put to Good Use

Seattle-based GreaterGood.com Inc. hopes to use Zaplets as part of its socially minded business. Retailers that sell products on the for-profit company's

Web site donate 15% of the purchase price to non-profit organizations such as the Special Olympics and Big Brother/Big Sister programs.

GreaterGood.com also manages The Hunger Site ([www.thehungersite.com](http://www.thehungersite.com)), which donates money from sponsoring corporations to the United Nations World Food Programme each time a consumer clicks on a button. FireDrop set up a Hunger Site Zaplet on its own Web site, enabling users to donate directly from an e-mail message and track the progress of donations made by friends.

"The success of [The Hunger Site] has been driven by word of mouth and essentially nothing has been done to spread [the] word, other than friends telling each other about it," says Katherine James Schuitemaker, executive vice president at GreaterGood.com. "It's one of those things where it only takes a moment to click on a button and you've made a difference." ▮

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## Collaboration Of the Month

Bridging the gap between real-time and Web-based collaboration isn't a new idea. A variety of firms, including Cambridge, Mass.-based eRoom Technology Inc. (formerly Instinctive Technology Inc.) and messaging powerhouse Lotus Development Corp., offer such products and services with eRoom and QuickPlace, respectively. Both products allow customers to set up collaborative work spaces on the Web or a corporate intranet. Once such a space has been established, users can share and store documents, create threaded discussions and meet in real time.

## Market Appeal

Forrester Research Inc. in Cambridge, Mass., estimates that there are more than 150 million mailboxes in existence worldwide. By bringing collaborative functionality to e-mail, FireDrop stands a chance of penetrating both the business-to-business and business-to-consumer markets, says Forrester analyst Navi Radjou.

"What FireDrop does is dynamically alter the content of e-mail," says Radjou. "E-mail is an asynchronous tool. It's not real-time and it's pretty boring. What these people [are] trying to do is bring a real-time component to e-mail and bring convergence from e-mail, instant messaging and real-time communications."

But Radjou says that if FireDrop decides to break into the corporate market with a stand-alone messaging product, it may prove to be a daunting task, as most major corporations have already implemented products such as Lotus Notes/Domino, Microsoft Corp.'s Exchange or Novell Inc.'s GroupWise.

"I don't think [FireDrop] will have an opportunity for expansion if they offer Zaplet as a stand-alone product," he adds. "It would be better to partner with the messaging giants — Lotus Notes and Exchange. They also need to be talking to the e-mail service providers for another set of partnerships. For the e-mail out-sourcers, [FireDrop's] product provides a new, competitive differentiator."

Still, FireDrop President David Roberts speaks optimistically about his company's chances against other tool vendors. "Static collaboration tools won't prevail in the long term," he says. "An Internet-based, integrated set of collaborative services is what FireDrop is doing, and [it's] breathing new life into e-mail by enlivening it with dynamic content." — Lee Copeland

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# The Reselling Of Atlanta

When naming high-tech meccas, Atlanta probably doesn't top your list. A new local campaign hopes to change that, but is it really needed? By Erik Sherman

**T**HE METRO Atlanta Chamber of Commerce is running a marketing campaign to draw information technology and high-tech professionals to the region. So far, the campaign has been relatively quiet, with displays in airports and advertisements in 15 college newspapers.

The chamber says it's taking its time as it learns how to run such a promotion. But with the promise of warmer weather in the air, the heat will soon crank up on the campaign. When all is said and done, the business group expects to have spent an unspecified seven-figure sum.

For years, Atlanta has been home to many high-tech companies and businesses that use IT, but as the chamber of commerce has found, technology is in the eyes of the beholder.

## THE CURRENT CLIMATE

One might question the area's need to emerge from the shadows, considering it already serves as headquarters for BellSouth Corp., Turner Broadcasting System Inc., The Coca-Cola Co., United Parcel Service of America Inc., The Home Depot Inc. and Delta Air Lines Inc. According to the Metro At-

lanta Chamber of Commerce, 165,000 high-tech employees make up just over 8% of the area's total workforce.

Aside from the massive economic strength in industries such as consumer products, logistics and telecommunications, there are approximately 9,000 high-tech firms in greater Atlanta. They include high-profile, publicly held high-tech ventures such as Priceline.com Inc., Scientific Atlanta Inc. and Healtheon/WebMD Corp. The 1997 revenues for the top 50 high-tech firms totaled close to \$8.5 billion.

## PERCEPTION

Atlanta's problem is one of perception. Many people, including those who should know better, view it as a sleepy city nestled in the Old South.

"From a perception standpoint, when you think of the high-tech industry, you probably don't think of Atlanta first," says Darrell Glasco, vice president of economic development at the Metro Atlanta Chamber of Commerce. Hence, the city's advertising campaign.

Although companies and workers are needed, the emphasis is now on the latter. "We can't bring in more companies until we have more workers,"

explains Glasco. "Otherwise, we start balkanizing the companies that are here."

## QUALITY OF LIFE

High-tech executives tout the quality of life around Atlanta. The average price of a home — even close to the city — is \$200,000, which is lower than the average prices in Boston, Silicon Valley and New York.

The three commonly stated problems with the area are crime, humidity and traffic. Many residents admit that there are dangerous areas in Atlanta but say crime is no worse there than in other cities.

Humidity and traffic aren't

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as easy to discount. Summers can be uncomfortable. Traffic can be bad in any city, but imagine needing 25 minutes to drive five miles, as one high-tech executive does — and that's 20 miles north of the city.

## HIRING PICTURE

Many companies have been able to hire the right person at the right time. "It has been surprisingly easy," says Doug Pendergast, general manager of the 275-person office at Internet services firm IXL Inc. "The one thing that will limit our growth is our ability to attract and retain great people. There will come a time when we run out of local talent."

But not everyone has been so lucky. "There aren't enough people with the skills to fill the professions," says Joe Kosick, president of Management Decisions Inc., an area high-tech recruitment firm.

Management Decisions has been able to recruit people from the East Coast but has had far less success enticing professionals from the Midwest and West Coast. Salaries in Atlanta are fairly comparable to those found in most of the country.

## IN THE MONEY

Companies and politics have at least one thing in common: They follow the money. For the most part, venture capital has focused on Silicon Valley and the Route 128 area near Boston.

"Georgia and Atlanta have had some perspective problems," says Chuck Johnson, a partner at Noro-Moseley Partners, an Atlanta venture capital group. But that is changing. "Some of the more selective ones are coming down, looking for local partners [to make and manage investments]," he says.

Derivion, a 2-year-old firm that creates electronic-billing software that enables banks to conduct business over the Internet, recently received \$45 million in a third round of funding.

Other companies that have seen equivalent levels of funding include LastMinuteTravel.com Inc., which ran the last ad that aired during this year's Super Bowl, and Enrev Corp., a vendor of high-speed battery chargers. Investment money means a regular flow of new companies and positions. ■

Sherman is a freelance writer in Marshfield, Mass.

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Selected candidate will lead and direct the U.S. Quality Management & Technology Planning team of Worldwide IS Architecture and Technology (WISAT). Duties include: assisting UK counterparts with the establishment of common practices/procedures for WISAT worldwide; defining/establishing Capacity Plans and Change/Problem Management strategies to measure organizational effectiveness; developing/monitoring reporting systems, disaster recovery initiatives and annual infrastructure budgets for U.S. operations; reviewing/managing contracts with major IS suppliers; ensuring compliance with external/internal regulations; and developing plans for operational implementations of standard technology architecture.

A BS degree in Computer Science or Physics with 8 years related experience is required. Candidates must possess 5 years experience in budget planning/financial management, technology planning, capacity planning and disaster recovery in a UNIX, NT, VMS and OS/390 environment. A minimum of 5 years experience managing IS professionals and 3 years experience in the pharmaceutical or related industry are essential.

We offer competitive salaries and a comprehensive benefits package. Interested candidates should forward resumes to: Human Resources-NB, Glaxo Wellcome Inc., P.O. Box 13398, Research Triangle Park, NC 27709. Fax: 919-483-0623. Please refer to Job #9967 on all correspondence. No agency referrals, please. An Equal Opportunity Employer M/F/D/V.

## GlaxoWellcome

Breakthrough Medicines For Everyday Living®

www.glaxowellcome.com

Job Line: (919) 483-2565

**Senior Software Design Engineer:** Analyze, design, develop and maintain web based tools used to provide the remote serviceability of medical diagnostic imaging products for global market of medical systems. Confers with Service and Design Engineers to identify and gather the necessary system requirements to support remote serviceability. Analyzes system requirements to develop workstation software tools to support serviceability of medical equipment such as MR (magnetic resonance) and CT (computed tomography). Implements and tests workstation (UNIX and NT platforms) software tools to ensure system reliability. Implements Six Sigma quality initiatives as deemed appropriate to reduce costs and increase system efficiency. Utilizes various Web server and Web browser technologies, including Netscape Enterprise Server, Netscape Directory Server, and Netscape Proxy Server. Utilizes various technologies to develop the software, including C/C++, Java, Perl, JavaScript and HTML. **Required:** is a Bachelor of Science degree in Electrical Engineering, Computer Engineering, Biomedical Engineering or Computer Science and two (2) years of experience in the position being offered or two (2) years of experience in the related occupation of Design Engineer - Medical Diagnostic Equipment. As part of the required experience in the position being offered or in the related occupation, the applicant must have had experience in designing, developing, implementing, testing and supporting workstation software tools to support the remote serviceability of medical diagnostic imaging equipment; had experience with programming languages, including C/C++, Perl, Java, and JavaScript; and had experience with Web server and Web browser technologies, including Netscape Enterprise Server, Netscape Directory Server, and Netscape Proxy Server. **Monday through Friday, 8:00 AM to 5:00 PM, 40 hours per week, \$59,181.20 annually. Qualified applicants can submit two (2) copies of resume and cover letter to: Mike Brooks File #C101371; DWE-ALC; PO Box 7972; Madison, Wisconsin 53707-7972. Reference file #C101371.**

### SOFTWARE ENGINEERS

needed to design and develop programs, graphical user interfaces (GUIs) and relational databases for SAP and Oracle on UNIX platforms and to implement systems based on client/server architecture. Master's required in Math, Computers, Engineering or any other related field of study, plus 6 months experience. Must have proof of legal authority to work in the U.S.

Salary: \$65,000/year for a 40 hour work week.

Interested applicants submit resume or C.V. to The Phila. Job Bank, 444 N. 3rd St. - 3rd Fl., Phila., PA 19123. Refer to Job Order #7061470. Ad paid by an Equal Opportunity Employer.

### INFORMATION TECHNOLOGY

Perot Systems is a leading information technology services and business solutions company, serving global clients in various industries including financial services, healthcare, energy, and travel & transportation. To learn more about our company and exciting career opportunities available worldwide, visit us at [www.perotsystems.com](http://www.perotsystems.com).

We are looking for individuals with an entrepreneurial spirit to join our growing team of professionals: Team Leader-Applications Development, Systems Technicians, Applications Development, Systems Integration, Systems Analyst, Systems Engineers, Principal Engineer, Data Center Operations, Database Administrators, Business Consultants, Business Analyst and Systems Design & Delivery.

Positions vary but can be located in Texas, California, Virginia, Michigan, Florida, Massachusetts, Illinois, Minnesota, Colorado, New York, Connecticut, Iowa, Kentucky, North Carolina, Pennsylvania, Arizona, District of Columbia, Georgia, Kansas, Louisiana, Maine, Maryland, Missouri, Nevada, New Jersey, New Mexico, Ohio, Oklahoma, Rhode Island, South Carolina, Tennessee, Utah, Washington, West Virginia or Wisconsin.

**perotsystems™**

email resumes to: [recruiting@ps.net](mailto:recruiting@ps.net) attn: 1LPUBITA

**Six Sigma Black Belt, Information Technology:** Leads company-wide culture change and improves business processes by driving Six Sigma strategy in the area of information technology (IT) for global manufacturer of medical diagnostic equipment. Applies DMAIC (Define Measure Analyze Improve Control) method to increase productivity and customer satisfaction and/or DFSS (Design For Six Sigma) to improve the quality of the company's new software applications and IT infrastructure. Analyzes and translates business needs into information technology projects covering such areas as the internet, extranet, intranet, web, client server, mainframe, telecom, IT Operations, office productivity systems, ERP and packaged implementations. Oversees the execution of IT projects with Six Sigma rigor. Applies the DMAIC method to redesign IT processes or solutions based on customer needs using tools like VOC (Voice of the Customer), Benchmarking, Root Cause Analysis, and process mapping. Utilizes DFSS to design IT processes and solutions using statistical tools such as DOE (Design of Experiment), QFD (Quality Function Deployment), and FMEA (Failure Modes and Effects Analysis). Monitors project implementation using Six Sigma standards. Conducts and manages multiple projects concurrently which require cross-functional, global, and customer interaction. Coaches and mentors information technology team members on current technology, six sigma, and company quality processes. Drives IT vision throughout the organization using change tools like CAP (Change Acceleration Process) and Workout. **Required:** is a Master of Science degree in Electrical Engineering, Biomedical Engineering, Computer Science, or Management Information Systems (MIS) and one (1) year of experience in the position being offered OR one (1) year of experience in the related occupation of Engineer or Systems Analyst. As part of the required experience in the position being offered or in the related occupation, the applicant must have had experience in analyzing, designing, developing, implementing, and supporting business information systems to support various business functions, including client/server software, web applications, ERP packages, data warehousing, data modeling, infrastructure development, technical architecture, and mainframe systems; had experience in applying DMAIC (Define Measure Analyze Improve Control) method and DFSS (Design For Six Sigma); had experience in using statistical tools such as DOE (Design of Experiment), QFD (Quality Function Deployment), and FMEA (Failure Modes and Effects Analysis). **Monday through Friday, 8:00 AM to 5:00 PM; 40 hours per week; \$58,000 annually. Qualified applicants can submit two (2) copies of resume and cover letter to: Mike Brooks File #C101364; DWE-ALC; PO Box 7972; Madison, Wisconsin 53707-7972. Reference file #C101364.**

**Datamatics** provides the opportunity for quality software professionals to be part of exciting high tech projects across most of the U.S. Our clients include many Fortune 500 companies, including IBM, Oracle Consulting Services, MCI, Unisys Corp., Walmat, PricewaterhouseCoopers, Wells Fargo, etc. We are currently looking for dedicated software professionals to join our team of consultants. We are recruiting IT Professionals at all levels with:

**MS/BS or equivalent & relevant work experience or at least 2 years experience in some of the following areas:**

**Oracle Developer/DBA • Visual Basic/MS Access • AS/400, Cobol/400, • RPG/400, AS/SET, JDE, JDE one world • C++, Java, HTML, Cold Fusion, ASP, CORBA, Visual Interdev • Oracle Financials/Oracle Manufacturing • Sybase Developer/DBA • Power Builder • Progress, MFG PRO • Informix Developers/DBA • Lotus Notes Developer/ADMIN • Dataware Housing • E-Commerce Analyst • Technical Resource Analyst • UNIX Administrators • SQL Server DBA • SIEBEL/REMEDY**

Candidates must be willing to relocate. We offer very attractive salaries, benefits, and relocation assistance. Kindly e-mail, fax or mail resumes to address below.

**Datamatics Consultants, Incorporated**  
2400 Pleasant Hill Rd.  
Suite 215, Duluth, GA 30096  
E-mail: [uspsba@datamatics.com](mailto:uspsba@datamatics.com)  
Fax: 770-232-9463

**Commerce Application Manager:** Job Location: Conshohocken, PA. Duties: Manage the system set-up & implementation of e-commerce applications. Design & develop internet, intranet & extranet solutions, incl. e-mail messaging systems, elec. banking, messaging architectures as well as intranet enabled data warehouses, web-based transaction facilities & internet & extranet security using Java, C++, CORBA & Application Servers. Design & develop database solutions & develop distributed applications using Java Application Servers, EJB, & Corba. Interact with clients & analyze & assess clients' needs. Provide detailed design specs. to client from a tech. & business standpoint. Create, eval. & manage project budgets and timelines. Build, lead & manage teams to meet goals & deadlines on budget. Resp. for training of consultants for division. **Requires:** M.S. in Comp. or Info. Sci., Eng., or related field & 3 yrs. exp. in the job offered or 3 yrs. exp. as a Consultant, Manager, or Technical Lead. Will accept B.S. (or foreign equiv.) & 5 yrs. prog. exp. in the computer ind. Exp., which may have been obtained concurrently, must incl.: 2 yrs. exp. managing the system set-up & implementation of e-commerce applications & 2 yrs. exp. using JAVA & C++. **E.O.E.** 40hrs/wk.; 8:00 a.m. to 5:00 p.m. Salary: 100,000/yr. Send resume (no calls) to: Diane Tuccito, AnswerThink Consulting Group, 817 W. Peachtree St., Suite 800, Atlanta, GA 30308. Must have legal auth. to work in U.S.

**Job #WEB 88368 Programmer Analyst-Plans,** develops, tests and documents computer programs, applies knowledge of programming techniques and computer systems. Evaluates user request for new or modified program to determine feasibility, cost and time required compatibility with current system and computer capabilities. Analyzes, reviews and alters program to increase operating efficiency or adapt to new requirements. Writes documentation to describe program development, logic, coding and corrections. Work involved extensive travel and frequent relocation. Must have 1 1/2 years of experience as a computer professional using Visual Basic, Visual C++ and Unix. Bachelor's degree in one of several limited fields required: engineering, computer science, mathematics, physics or chemistry. **M-F 9am-5pm, 40 hrs/wk, \$62,500/yr.** Please forward resume listing above job number to: Mr. James Woods, Pittsburgh East Job Center, 6206 Broad Street, Pittsburgh, PA 15206.

**SOFTWARE ENGINEER**  
Software engineer to design, develop and test computer programs for business applications; analyze software requirements to determine feasibility of design; direct software system testing procedures using expertise in RPG 400, DB2/400, and QUERY 400. Salary: \$66,000/year. Working Conditions: 8:00 A.M. to 5:00 P.M. 40 hours/week, involves extensive travel and frequent relocation. **Requirements:** Bachelor's Degree or equivalent in Computer Science or related field and two years experience as a software engineer or computer programmer, knowledge of RPG 400, DB2/400, and QUERY 400. Salary: \$66,000/year. Working Conditions: 8:00 A.M. to 5:00 P.M. 40 hours/week, involves extensive travel and frequent relocation. **Apply:** Mr. Tom Wessels, Indiana Job Center, 350 N. Fourth Street, Indiana, PA 15701. Job No. WEB8770.

**Project Leader:** Prepare project plans, schedules, requirements, and work assignments for moderately to highly complex data processing projects using PC, M.S. Project, Word, and Excel; Develop work flow diagrams from information defined by user needs assessments for data processing systems; Supervise and participate in the feasibility study, cost/benefit analysis, resources requirements, and development recommendations for moderately to highly complex data processing projects; Supervise and participate in the development of computer system design specifications for Relational Databases like DB2 and IMS using COBOL and ADS/O and JCL; edit and/or maintenance program in an IBM environment; Define monitors, and provide management reports on project tasks and milestones; Supervise, monitor, and direct the development and execution of all levels of computer software testing using COBOL; Diagnose and monitor implementation plan and schedule; Supervise development of the computer system and user documentation; Conduct user reviews and management reports; Prepare and deliver management reports and train and provide feedback to members of team. Master's degree in Computer Engineering or equivalent foreign degree. \$80,000.00 per year, 40 hrs/wk, 8am-5pm, or n/a, M-F. Please apply by sending your resume to Mr. Bernard Chidister, Nebraska Job Service, P.O. Box 94800, Lincoln, NE 68509. Refer to Job Order NE 0263715. Applicants must have proof of legal authority to work in the United States.

**Programmer Analyst:** Plans, develops, tests, and documents computer programs. Converts project specifications, using flowcharts and diagrams, into sequence of detailed instructions and logical steps for coding into computer language. Analyzes, reviews and alters program to increase operating efficiency or adapt to new requirements using RDBMS and related software. Work involves extensive travel and frequent relocation. Must have 1 year of experience in job offered or as a computer professional as well as a year using: 1 from Group A and 2 from Group B OR 1 from A and 1 from B and 1 from C OR 1 from A and 2 from C. A) DB2, FoxPro, Informix, Ingres, MS-Access, Oracle, Paradox, Sybase, Unify; B) AIX, DOS, HP-UX, MVS, Novell, OS/2, Sun OS, UNIX, VAX/VMS, Windows; C) 4GL, APT, C++, CORBA, Case Tools, C Shell, Crystal Reports, E-SQL, Etrieve/Key, JAVA, ODBC, PowerBuilder, PowerDesigner, PowerTools, J. Power++, S-Designer, SQL, Shell Script, Visual Basic. Bachelors degree or equivalent in one of several limited fields: Computer Sci/Apps, Eng., Chem., Math, Physics or a scientific or business related field. Salary: \$60,000 per yr, 40 hrs/wk., 9:00-5:00 p.m. Please submit resumes to: Mr. Joseph Strath, Director, Pittsburgh/Allegheny Careerlink, 425 Sixth Avenue, Suite 2200, Pittsburgh, PA 15219. Reference: Job Order No. WEB 87601.

**SOFTWARE ENGINEER**  
Software engineer to design, develop and test computer programs for business applications; analyze software requirements to determine feasibility of design; direct software system testing procedures using expertise in RPG 400, DB2/400, and QUERY 400. Salary: \$66,000/year. Working Conditions: 8:00 A.M. to 5:00 P.M. 40 hours/week, involves extensive travel and frequent relocation. **Requirements:** Bachelor's Degree or equivalent in Computer Science or related field and two years experience as a software engineer or computer programmer, knowledge of RPG 400, DB2/400, and QUERY 400. Salary: \$66,000/year. Working Conditions: 8:00 A.M. to 5:00 P.M. 40 hours/week, involves extensive travel and frequent relocation. **Apply:** Mr. Tom Wessels, Indiana Job Center, 350 N. Fourth Street, Indiana, PA 15701. Job No. WEB8770.

**Software Developers, Positions** available in our New York, Chicago and San Francisco area offices. Will work with exceptional individuals in a business professionals participating in full life cycle development of distributed, object-oriented applications. Will design, develop, and implement enterprise wide, distributed applications in various environments. Will interface with customers and other functional databases. Will utilize OO languages, including Fortran and C. Will be responsible for tasks such as Informatica, Oracle, Sybase, MS SQL Server, and DB2. **Requirements:** Bachelor's degree in Computer Science, Computer Engineering or Electrical Engineering or foreign equivalent, plus five years of experience in object-oriented programming in an object-oriented programming language; or Master's degree, Computer Science, Computer Engineering, Electrical engineering, or equivalent. If interested, please email your resume and cover letter to [info@thomson.com](mailto:info@thomson.com).

**Business Analysis:** Positions available in our New York, Chicago and San Francisco area offices. We work with exceptional teams of computer and business professionals participating in the full-cycle design and development of distributed, object-oriented applications. Will apply OOA analysis and modeling methods to object modeling techniques to analyze and design systems responsible for working with users to define system requirements and develop requirements into clear and precise specifications for the developers. Will analyze and design screens, write use cases, design and perform system testing, and develop and test applications. Experience in Finance, Computer Information Systems and Business Systems Analysis. 2-3 years of business systems analysis experience. Must have strong communication and verbal selection, design and/or development, implementation and testing experience. If you are interested, please email your resume and cover letter to: [info@csapp.com](mailto:info@csapp.com)

**Software Engineer (2 openings)**  
Design, develop and implement software systems to determine feasibility of design and direct software development, testing, programming and documentation. Must have one year of experience using 1 of 2 A and B languages: Group A: C++, Oracle RDBMS, Designer 2000, Developer 2000, Oracle Applications (Finance, Manufacturing, HR, etc.); Group B: Oracle Forms, Oracle Reports, SQL\*Plus, Pro\*C, PL/SQL, SQL\*Forms, SQL\*Proc. Works requires extensive knowledge of database systems. Bachelors degree in one of several fields: Computer Sci/Apps, Eng. Chem., Math or

Applications/IT Architect. Positions available in our New York, Chicago and San Francisco offices. We are looking for exceptional teams of computer and business professionals to help us build a new department of distributed, object-oriented applications. Will develop and implement enterprise-wide, distributed applications across CO, client-server environments against various regional databases. Will utilize Java, C++, C, Fortran and Java and relational databases such as Informatica, Oracle, and DB2. Will lead development teams. Requirements: Bachelor's Degree in Computer Science, Computer Engineering or Electrical Engineering. Excellent, plus five years of experience, which must include experience with object-oriented programming language, or Master of Science in Computer Science or Computer Engineering or Electrical Engineering. If you are interested, please send your resume and cover letter to: [hr@cs.com](mailto:hr@cs.com) or 800/875-8275. Salary: \$66,000 to \$90,000. Equal Opportunity Employer. Please submit resumes to: Mr. Anthony Gebicki, Manager, Westmoreland County Career-Link, 300 E. Hills Street, Youngstown, OH 44503-1981. EOE. Job Order No. WB87007

**Emerald Solutions, Inc.** is seeking IT professionals to join our dynamic NATIONAL consulting firm.

**Software Engineers:**  
Must have a Bachelor's Degree in Computer Science or related field and a minimum of 5 years related progressive work experience.

**Programmer Analysts:**  
Must have a Bachelor's Degree in Computer Science or related field or the equivalent education and experience.

We have offices in Birmingham, AL, Phoenix, AZ, Greenwood Village, CO, Atlanta, GA, Edina, MN, Warren, NJ, Portland, OR, Dallas, TX, Vienna, VA, and Bellevue, WA.

Send resume, including location preference to:

**Emerald Solutions, Inc.**  
**Ref#CWAD04**  
111 SW 5th Ave., #2700  
Portland, OR 97204  
E-mail:  
[cwad04@emeraldsolutions.com](mailto:cwad04@emeraldsolutions.com)  
EOE

programmer/analyst to document, develop, test and maintain computer programs, applying knowledge of programming languages and systems to develop systems. Evaluate user requirements for new or modified programs to determine feasibility and cost. Develop and test programs in accordance with current systems and computer capabilities. Formulate program specifications and develop program; convert project steps into sequence of detailed instructions; write program code in language processable by computer, applying knowledge of computer languages. Modify programs to correct errors or programs to increase operating efficiency or adapt to new requirements. Coordinate with user, exp. as job offers for software engineer req. Salary \$20,000-\$25,000. Unannounced sites throughout the U.S. Employer location: Washington. Send resume to Job #WB 87282 to: American Center Manager, Millcreek Center, Suite 150L1, Washington

Software Engineer (2 openings).  
Design, develop and implement software systems to determine feasibility of design and direct the construction of software programs and programming and documentation. Must have one year of experience using 1 of Group A and 3 of Group B OR 2 of 1 Group A and 5 of B, as follows: 1. Group A: C++, C, Fortran, Pascal, Perl, Prolog, PL/SQL, SQL, S.O.L. Forms, SOL. Reports. Work requires extensive travel and frequent relocation. Bachelors degree in one of the following: Computer Science, App. Eng., Chem., Math or Physics or scientific or business related field. Salary: \$66,000. 2. Group B: 40 hrs/wk., 3:00-5:00 p.m. Job Order # 150. Manager: Anthony Gebicki, Manager, Westmoreland County Council, 300 E. Hills Street, Youngwood, PA 15697-1080. Reference: Job Order # 150. EOE.

**Senior Systems Analyst, Development, Install, & support major computerized systems for electric and gas company that meet the needs of customers, regulatory agencies, procedures, & client business needs. Internet, Client Server, & intranet/frame-based environments. CICS, CAC Scheduler, Easytrieve, Plus, PowerBuilder, Expedit, Visual Basic, COBOL, and Java. Also, TSO, PL/SQL products, & Sybase. Lead project teams to develop integrated information systems. Develop & test programs, & test & verify logic & database design. Analyze DB2 performance problems. Solve business process problems. Develop & test programs. Cooper Source 2000 CS software.**

**Experience/Education:** 10 years experience in computer science or related discipline plus at least two years of software development experience in the above mentioned areas.

**Work Schedule:** 40 to 50 hrs per wk/8:00 a.m. to 5:00 p.m. M-F.

**Job Location:** Columbia, SC

**Salary:** \$40,000 per year, plus benefits.

**Resume to:** Kim Holland, Human Resources - SCANA Corp., 1000 North Main St., Columbia, SC 29218.

**Senior Analyst/Programmer.** Conduct and prepare analysis, design, development, and data processing projects. Coordinate the design & development of the specification of the system from diagrams & related design documentation. Design & develop program specifications for the development of the program using the C++ language. Prepare test plans & test data for system & user-level testing. Coordinate user-level testing. Design, develop, & implement modifications to existing systems. Develop IDMS on MVS. Develop COBOL, JCL, CICS, & REXX on an ADS online environment. Prepare management reports. Train users & provide tech support & ensure accuracy of tasks & compliance with standards. Masters degree in Electronics or Equivalent. Minimum 5 years of direct experience or 1 year of indirect experience as Systems Analyst or Programmer/Analyst. \$75,000.00 per year, 40 hrs/wk, 10 hrs/spot. Send resumes apply by sending your resume to Mr. Bernard Childerston, Nebraska Job Order, P.O. Box 10000, Omaha, NE 68108 for Job Order NE 026431. Applicants must have proof of legal authority to work in the

**Senior Consultant.** Perform requirements analysis, create project plans to migrate legacy COBOL/CICS systems to client/server architectures such as Oracle, Informatica, etc., functional specifications documents. Develop a data model, develop the applications and perform the implementation using ORACLE 8.01, ORACLE FORMS 6.0, REPORTS 2000, Rel.2.1, PowerBuilder 6.0, SQR Designer 6.1, on an SQR Server 6.0, sql Navigator & Microsoft Project 98. Oversee development team, coordinate and coordinate user-level testing. Prepare management reports. Train users. Supervise subcontractors and ensure accuracy of tasks and compliance with standards. Minimum degree B.S. or equivalent foreign degree B.S. in Engineering or equivalent foreign degree plus five years progressive experience. \$58,000.00 per year. M-F. Please apply by sending your resume to Mr. Bernard Childerston, Netbraska Job Service, P.O. Box 94600, Lincoln NE 68509. Refer to Job Code 17-00000000000000000000. We have proof of legal authority to work in the United States.

**Senior Software Engineer:** One opening; Design, develop and implement software systems to determine feasibility of design and directs software testing programs; Must have extensive experience in documentation. Work involves intensive travel and frequent relocation. Must have one year of experience using: 1 of Group C or 1A and 2 of B or 2 of C or 1A and 2 of C as follows:  
**OR** 1 A and Windows 3.1, Win95, HP-UX, IRIX, Sun OS  
Group B - Visual C++, Visual C#. C++, Visual Basic, PowerBuilder  
Group C - JAVA, PERL, ASP, COMDCOM, ActiveX  
M, MTS, Master's degree in one of several limited fields: Computer Sci/Apps, Eng., Chem., Physics, Biology, Mathematics.  
Bachelors degree with five years of progressive experience as computer professional. Salary is \$75,000 per year, 40 hrs/wk., 9 am-5 pm, Monday-Friday. Resumes to: Mr. James K. Mackinnon Manager, Beaver Falls Job Center, 2103 Ninth Avenue, Beaver Falls, PA 15010. Job Order No. 1680.

Lead, model, analyze, design and develop multi - tier client/server commercial, and business application. Analyze and model business processes and systems, design and develop processes, and develop object-oriented methodologies such as Booch, and Rumbaugh. Develop application using VC++, MFC, QLE/COM, CDC, EDC and use version control systems such as PVCS and Source Safe. Work with and provide database access through ODBC and DB Libraries using stored procedures, triggers and shell scripts for MS SQL server, Sybase on NT, and Unix platforms such as AIX, IBM RS/6000. Demonstrated ability defining, designing and implementing workflow processes for Banking, Financial and Enterprise Management Applications and code optimizing using profiling techniques and tools such as MS Profiler and Visual Studio. Test, monitor, analyze, design a growing and developing reports and Online Reports, Pages, Small World, SQL, or other commercial server, tested 567,000/hr d/h/wk, 9 a.m. - 5 p.m. Must have 5yrs. exp. and B.S. in Comp Sci. Eng. Int. rel. field/exp Send 2 resumes (case#11999030) to: P.O. Box 8668, Reston, MA 02114.

**Senior Software Engineers (multiple openings)** Design, develop and implement software systems to determine feasibility of design and direct software testing procedures; programming and documentation of computer programs; analysis of system requirements. This position involves extensive travel and frequent relocation. Must have 1 year of experience using 1 from Group A and 2 from Group B OR 1 from Groups A and B and 2 from C OR 1 from A and 2 from C. A) DB2, FoxPro, dBase, Visual Basic, Visual FoxPro, Access, Paradox, dBase III, etc. B) ALX, DOS, HPV, MVS, Novell, C++, Sun OS, UNIX, VAX/VMS, Windows, G4C/APL, C#, C++ , COBOL, Case Tools, C Shell, Crystal Reports, E-SQL, Easytrieve, Fortran, JCL, PL/I, REXX, SAS, etc. C) S-Designer, Solid, Shell Script, Visual Basic. Master's degree in one of several limited fields; Computer Science, Eng., Chem., Math. Physics or a scientific or business related field. Salary \$70,000-\$90,000 per year depending on qualifications and experience as computer professional. Salary is \$75,000 per year/40 hrs/wk., 9:00-5:00 p.m. Please submit resumes to Mr. Clement Zuckerman, Personnel, Unwotown Job Center, 32 Iowa Street, Unwotown, PA 16801. Equal Opportunity Employer.

lead, model, analyze, design and develop multi-tier client/server commercial, and business application. Analyze and model business, industry and application requirements, user requirements, use object-oriented methodology such as Booch, and Rumbaugh. Develop application using V++, MFC, OLE/COM, DCE, and IDE, use version control systems, and use CASE tools like Rational Safe. Work with and provide database access through ODBC and DB Libraries using stored procedures, triggers and shell scripts for MS Access, Sybase on NT, and Oracle on Solaris. UNIX, IBM RS-6000 Demonstrated ability in developing, designing and implementing workflow processes for Banking, Financial and Enterprise Management Applications. Demonstrated ability using profiling techniques and tools such as MS Profiler and Visual Studio. Demonstrated ability in designing and developing reports using Crystal reports, and other commercial report processors. \$65,000/yr 40 hr/wk 9 a.m.-5 p.m. Must have 2yrs exp and M.S.in Comp Sci, Eng rel field/cpe/Send 2 boxes: CASE19990806 21214

**Senior Analyst/Programmer**  
 Conduct & prepare systems investigations for data processing projects & systems. Design & develop systems & programs or systems or subsystems from diagrams & related system documentation using MS-Word & MS-Excel. Develop program specifications for highly complex programs. Code multiple high complexity programs using COBOL, PL/I, and data and oversee & coordinate system & user-level testing. Design, develop, & implement high complexity systems using Oracle, Sybase, and Informatica. Prepare management reports & proposals. Supervise & supervise subordinates & ensure accuracy of tasks & compliance with standards. Tools used include: MS-Word, MS-Excel, MS-SPUI, & Softchad. DB2 tool: ISPF. CEDF and Interest. M.I. degree in Engineering or foreign equivalent. 3 years related experience as Programmer/Analyst or Software Engineer. Need 200,000 per year. Please apply by sending a resume to Mr. Bernard Chidister, 1000 Nebraska Link, N. 68050, Bedford, IA. 68009. Refer to Job Order #1264523. Applicants must have proof of legal authority to work in the U.S.

**Director, Supply Chain** Join a leading national food chain: Conshohocken, PA. Duties: Direct & manage supply chain mgmt; application practice & e-business practice by creating, customizing & implementing solutions. Resp. for the hiring & training of tech. consultants in the supply chain division. Resp. for educating current consultants on Strategic Opportunity Assessment. Develop revenue for business selling projects worth \$500K to \$1M million. Design & develop applications. Develop & maintain working relationships with partner firms on joint develop., joint sales & joint implementation of applications. M.S. in Ops., Research, Statistics, Comp. Sci. or related field with 1 yr. & 6 mths. exp. in the job offered or 1 yr. & 6 mths. exp. in supply chain mgmt. or Consultant. Exp., which may have been obtained concurrently, must incl.: 1 yr. exp. designing & developing software modules for supply chains. Send resume (no calls) to: David Tucco, AnswerThink Consulting Group, 817 West Peachtree St. Suite 800, Atlanta, GA 30308. We have legal auth. to work in U.S.

**Manager of Computer Operations:** Directs and coordinates activities of computer operators and computer technicians. Plans and directs computer operations and procedures for efficient carrying out of work. Plans and develops policies and procedures for running out computer operations. Meets with subordinates to discuss progress of work, resolve problems, and ensure that standards for quality and quantity of work are met. Work involves extensive travel and frequent relocation. Must have 1 year of experience in job offered or at least 2 years in related work. **Education:** Graduate of a college or university from Group B or from A and 1 from B and 1 from C or 1 from A and 2 from C. **A1:** DB2, FoxPro, Inform, Ingres, MS-Access, Oracle, Paradox, Sybase, Unibus, Vj; **A1X:** DMS, DPL, HPL, MVS, Novell, OS/2, OS/386, UNIX, VAX/VMS, Windows; **A4:** ASP, CPT, C++, COBOL, Case Tools, C, C#, Crystal Reports, E-SQL, Easytrieve, Java, ODBC, Pascal, PL/I, PL/SQL, Power J, Power SQL, S-Design, SQL, SQL\*Plus, Shell Script, Visual Basic. **Master's degree** in one of several fields: Computer Sci/Apps, Eng., Chem., Math. Physics or a scientific or business related field. Will accept Bachelor's degree with five years of progressive experience as computer professional. Salary is \$100,000 per year plus bonuses, 40 hrs/wk., 9:00-5:00 p.m. Please submit resumes to: Mr. Terry Kinney, Manager, Armstrong County Job Center, 1270 N. Main Street, P.O. Box 759, Kingston, PA 16021.

Order No.: WEB 87817

**Software Engineer:** Design, develop and implement computer software systems applying principles and techniques of computer science, engineering and mathematical analysis. Analyzes software requirements, designs software systems, develops software programs, tests, debugs, procedures, programming and documentation. Work involves extensive travel and frequent relocation. Must have one year of experience as a software engineer or computer professional and one year of experience in the design, development, testing, and debugging of software. 1 of A and 2 of B or 1 of A and 2 of C as follows: Group A – Windows 3.x, Windows NT, Windows 95, Windows 98, Unix, HP-UX, IRIX, RSX, SGI, Solaris, VMS, and other operating systems; Group B – C, C++, Visual Basic, Builder; Group C – JAVA, TCP/IP, HTML, MFC, CGI, Perl, ASP, COM/DCOM, Active X. Master's degree in one of several related fields: Computer Science, Engg., Chem. Math or Physics. Bachelor's degree in Computer Science, Engg., Chem. Math or Physics. Salary \$100,000 per year plus bonuses, 40 hrs/week, 9:00-5:00 pm. Please submit resumes to: Mr. T. S. Ramesh, Director, IIT Madras, Chennai 600 075, India. India, 94 1571, Job Order No.: WE#87631

**Design and development** Object-oriented systems to support business functions and processes. Analyze and Model business, industry and processes. Analyze and Model business, industry and application specific processes and requirements using object-oriented methodologies such as Booch, Rumbaugh, or Coad/Yourdon. Design, develop and enhance application code and class libraries using object oriented development tools such as C++, O-Code windows Library or Rational Rose, DMT Visio tools. Use debuggers such as XLDB, DBX, Symantec ClearCase and SCCS. Demonstrated ability using programming techniques such as design patterns, polymorphism, and multiple inheritance in cross platform software development on UNIX platforms such as Sun, HP, SCO using integrated development tools and configuration management systems. Demonstrated ability using triggers, stored procedures, dBaseAccess, PL/SQL and SQL Plus to work on databases systems such as Oracle and Microsoft Access. \$60,000 - \$90,000 per year.  
Specialties include: SCGLC and 9 S in Engineering field; worked at Sprint 2 summers August 1998-Present. P.O. Box #898, Mt. Airy NC215414.

**Software Engineer** (One opening). Design, develop and implement software systems to determine feasibility of design and direct software testing procedures, programming and documentation using relational database management systems (RDBMS). Work involves external travel and frequent relocation. Must have one year using 1 from Group A and 2 from Group B **OR** 1 from A and 1 from B and 1 from Group A and 2 from A and 2 from C A DB2, FoxPro, Inform, Ingres, MS-Access, Oracle, Paradox, Sybase and Unix. B) AJAX, IDIS, HP-UX, MVS, OS/2, OS/2 S, UNIX, VAX/VMS, Windows; C) 4GL, Apt, C++, COBOL, Case Tools, C, Shell, Crystal Reports, E-SQL, Easytrieve, JAVA, ODBC, PowerBuilder, PowerDesigner, Power 9, Power++ S-Designer, SQL Script, Visual Basic. Bachelor's degree in one of several limited fields: Computer Sci/Apps, Eng, Chem, Math. Physics or a scientific or business related field. Salary is \$66,000 per year. For more information, contact: **Mr. Robert J. Gorman, Director, Center Manager, Millicent Center, Suite 150 LL, 90 West Chester Street, Washington, PA 15301. Job Order No. WFB97839**

Following soft copy positions available for experienced IT professionals for the Atlanta, GA based consulting firm:

- a) 3 AS/400/COBOL, RPG professionals with programming on mainframe applications, expertise on methodologies using IEV, SILEVRUN and development tools such as Implementer and Hawkeye. Also 2 candidates with experience on J.D Edwards 7, sales and distribution modules, financials and conversion experience using INSURE 50 required.
- b) 2 positions for Oracle Developer and DBA, Oracle Workgroup server exp., Oracle Enterprise, Developer 2000, ERWIN on HP-UNIX and Win NT platforms.
- c) 1 Strong SYBASE DBA and developer with atleast two years of Power Builder Other skills needed for this position include SCL, UNIX and SVR4 open system installation, management and network administration experience, MF-COBOL, and Visual Basic programming.

Minimum salary \$58000/year. Send resume to Bell USA Inc, 323 Satellite Blvd, Bldg 400 Suite 300, Duluth GA 30096.

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Schaumburg, IL 60173



**Senior Programmer/Analyst** to analyze, design, develop, test, implement, maintain, and support application contract driven software in a client/server environment using PowerBuilder, PFC, Oracle, SQL\*Anywhere, and S-Designer on Unix platform; Perform project management; Analyze existing systems to evaluate effectiveness and develop new software systems to improve data processing using advanced mathematical, numerical analyses and computer methodology. Require: B.S. degree in Computer Science, or a closely related field, with two years experience in the job offered or as a Programmer/Analyst. Salary: \$68,000 per year, 8:00 am to 5:00 pm, M-F. Send resume to: Donna Bowling, Human Resources Manager, Revenue Systems Inc., 2555 Westside Pkwy., Suite 300, Alpharetta, GA 30004. Attn: Job ES

### SOFTWARE ENGINEER

Software engineer to design, develop and test computer programs for business applications; analyze software requirements to determine feasibility of design; direct software system testing procedures using expertise in PowerBuilder, C and Sybase. Requirements: Bachelor's Degree or equivalent in Computer Science or related field and two years experience as a software engineer or computer programmer. Knowledge of PowerBuilder, C and Sybase. Salary: \$66,000/year. Working Conditions: 8:00 A.M. to 5:00 P.M., 40 hours/week, involves extensive travel and frequent relocation. Apply: Mr. Anthony Gebicki, Westmontland Careerlink, 300 E. Hills Street, Youngwood, PA 15697-1808. Job No. WEB87771.

### Computer

#### SENIOR SYSTEMS ANALYST

##### SOUTHWESTERN COLLEGE

Community College position: Perform evaluations, installation, conversions, implementation and administration of enterprise information systems in active, diverse computer center. Experience in DataTel college system a plus. Any combination equivalent to BA Degree in Math/Computer Science & 3yrs. programmer experience.

Salary: \$4,634/mo & excellent benefits. For application materials contact: Southwestern College, Human Resource Office, (Bldg. 1650), 900 Day Lakes Road, Chula Vista, CA 91910 (619) 482-6395. Application deadline: 4/28/00 Equal Opportunity Employer.

**Software Engineer:** Design and develop complex applications for telecommunication industry. Develop distributed systems and O3 interface for TMN application using C++, C, and Java programming languages and GDMO Toolkits. Develop engineering applications using C++, Oracle, and multithreaded programming concepts. Develop GUI application using X/Motif on Unix platform. Develop object-oriented interface to relational database using Regenerative tools. Req. Master's in Computer engineering, or electrical engineering, or other related engineering discipline plus 2 yrs exp. in job offered. Sal \$70K/yr. Resume to: Recruiting Manager, SysArch, 3370 Commons Gate Bend, Norcross, GA 30092.

**Business Analysts:** Positions available in our New York, Chicago and San Francisco area offices. Will work as team leaders with exceptional teams of computer and business professionals participating in full life-cycle development of distributed, object-oriented applications. Will apply OO analysis and design methodologies and object modeling techniques to design OO applications. Will be responsible for working with users to define system requirements. Will translate those requirements into clear and precise specifications for the developers to implement. Will design screens, write use cases, design and perform system testing. Requirements: Master's degree in Business, Computer Information Systems or related field, or equivalent. If interested, please email your resume and cover letter to: jobs@thoughtworks.com.

**Senior Software Engineer** Design, develop and implement software systems to determine feasibility of design and directs software testing procedures, programming and documentation. Work involves extensive travel and frequent relocation. Must have one year of experience using SAP. Masters degree in Computer Science/Applications, Engineering, Chemistry, Math, Physics or a business related field. Will accept Bachelors degree, or foreign equivalent, with five years of progressive experience as computer professional. Salary is \$100,000 per year, 40 hrs/wk., 9:00-5:00 p.m. Please submit resumes to: Ms. Barbara Cole, Supervisor, Greene County Team PA Career Link, 4 West High Street, Waynesburg, PA 15370. Job Order No.: WEB 87897.

### SOFTWARE ENGINEER

Software engineer to design, develop and test computer programs for business applications; analyze software requirements to determine feasibility of design; direct software system testing procedures using expertise in Visual C++, SQL Server, C and MFC. Requirements: Master's Degree or equivalent in Computer Science or related field and two years experience as a software engineer or computer programmer. Knowledge of Visual C++, SQL Server, C and MFC. Salary: \$93,600/year. Working Conditions: 8:00 AM to 5:00 PM, 40 hours/week, involves extensive travel and frequent relocation. Apply: Mr. Joseph Stratico, Pittsburgh Allegheny Careerlink, 425 Sixth Ave., Suite 2200, Pittsburgh, PA 15219. Job No. WEB87782.

**Software Engineer:** Design, develop and implement software systems to determine feasibility of design and directs software testing procedures, programming and documentation. Work involves extensive travel and frequent relocation. Must have one year of experience using SAP. Bachelors degree in Computer Science/Applications, Engineering, Chemistry, Math, Physics or a business related field. Salary is \$80,000 per year, 40 hrs/wk., 9:00-5:00 p.m. Please submit resumes to: Ms. Margaret Weckerly, Act Manager, Butler County Job Center, 227 West Cunningham Street, Butler, PA 16003. Job Order No.: WEB 87605.



PEOPLE WITH THE FOLLOWING SKILLS NEEDED FOR ASSIGNMENTS THROUGHOUT THE USA: ORACLE, SYBASE, POWERBUILDER, AS-400, PROGRESS, UNIX SYS ADMIN, NATURAL, SQLSERVER, JAVA, INGRES, PLEASE MAIL RESUME TO: DIR. RECRUITING, Skillsoft Incorporated, 20283 State Road 7, Suite 300, Boca Raton, FL 33498, U.S.A. www.skillsoftusa.com

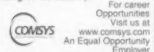
**PROGRAMMER/ANALYST** to analyze, design, develop, test, implement, maintain, and support software for various applications using C, COBOL, BASIC, Visual Basic, Dec Forms, Database, ACMS, CMS, DCL, Oracle, and VAX RMS under Windows, VAX/VMS, Open VMS, and UNIX environments. Require: B.S. degree in Computer Science, or a closely related field, with 2 years of experience in the job offered. Extensive travel on assignments to various client sites within the U.S. is required. Salary: \$68,000 per year, 8:00 am to 5:00 pm, M-F. Apply by resume to: Raghavendra Kulkarni, President, Pro Softnet Corporation, 3235 Satellite Blvd., Bldg 400, Suite 300, Duluth, GA 30096. Attn: Job KJ.

**SENIOR SOFTWARE ENGINEER** to design, develop, implement and maintain various client server/Web based applications using object-oriented techniques, ActiveX, COM, Visual InterDev, ASP, HTML, Visual Basic, ROBMS, SQL Server and Crystal Reports on Windows 95/98/NT operating systems. Require: M.S. degree in Computer Science, an Engineering discipline, or a closely related field, with two years of experience in the job offered or as a Programmer/Analyst. Extensive travel on assignments to various client sites within the U.S. is required. Salary: \$70,000 per year, 8:00 am to 5:00 pm, M-F. Apply by resume to: Vishy Datta, President, Objectnet Technologies, 117 Perimeter Center West, Suite N402, Atlanta, GA 30328. Attn: Job AP.

### IT PROFESSIONALS NEEDED

COMSYS is an established IT consulting firm that serves leading corporations including 129 of the Fortune 500. With COMSYS, you get: Extensive Benefits, Additional Compensation for referrals, and Professional Challenges with training and assignments to keep you at the forefront of technology. With over 20 offices, we need the services of experienced consultants across the US:

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- Web-based Technologies;
- Mainframe Legacy System; and
- Technical Recruiters (specializing in the above).



### SOFTWARE ENGINEER

Software engineer to design, develop and test computer programs for business applications; analyze software requirements to determine feasibility of design; direct software system testing procedures using expertise in Visual Basic, Oracle, C and Windows SDK. Requirements: Bachelor's Degree or equivalent in Computer Science or related field and two years experience as a software engineer or computer programmer. Knowledge of Visual Basic, Oracle, C and Windows SDK. Salary: \$66,000/year. Working Conditions: 8:00 AM to 5:00 PM, 40 hours/week, involves extensive travel and frequent relocation. Apply: Mr. Clement Pizzutelli, Uniontown Job Center, 32 Iowa Street, Uniontown, PA 15401. Job No. WEB87792.

OST International Corporation, Naperville, IL needs Systems Analysts with the following skill set: COBOL, JCL, CICS, DB2 and COGEN & CABS (insurance packages.) Min 2 yrs. Must have proof of authorization to work permanently in the U.S. Fax resume to: (630) 983-7747 or email to: Sandy@ostintl.com.

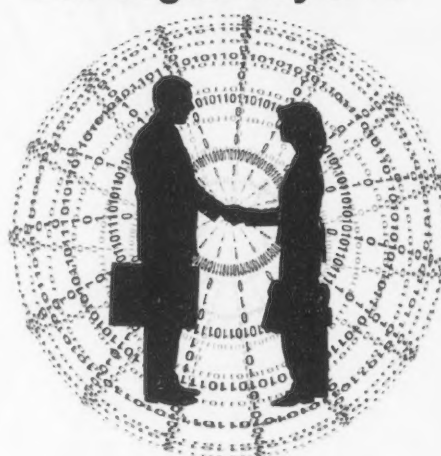
**Principal Programmer/Analyst** Requires a bachelor's degree in computer science or a related field and five years' experience in the job offered or five years' experience in database software development using Oracle 7.0 or 8.0. Stated experience must also include 5 years of experience using Oracle Reports, Oracle Designer, and Unix C or Bourne Shell Scripting; and two years of experience using Oracle Forms, C, and C++. Apply with resume to KAT/KS 653, Walt Disney Imagineering, Professional Staffing, 1401 Flower Street, Glendale, CA 91201.

### Senior Programmer - Special Projects (SP) & EDI Specialist (EDI)

B.S. in Engineering/Computer Science plus two years experience, or M.S. in Engineering/Computer Science. Competitive salary and benefits. Please list the above job code for the position for which you are applying and forward your resume to: Maggie Mason, Tom McLeod Software Corp., 200 Century Park South, Suite 100, Birmingham, AL 35226.

Preempt, LLC, a Minneapolis corporation needs the services of a Business Analyst to carry out project planning, costing analysis & develop im. Mgmt. Info. Sys. using J D Edwards' OneWorld Dev. & Tech Tools. Parallel Port Applications on IBM AS/400 & J D Edwards V673.3.2 JDE World, JBA & ILE RPG, RPG/400, CL/400. Min. 2yrs exp. Salary \$50,000/yr with benefits. Fax resume to (612)-829-1240 or e-mail to: deb@preempt.com

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**User Support Analyst** (Houston, TX): Installs radio frequency wireless network software and hardware, develops user manuals and procedures; provides training on-site or in classroom and customer problem-solving support using knowledge of complex network design; writes software and hardware evaluation and recommendation for management review. Bachelor's degree in Computer Science or Electrical Engineering plus 2 years in carrying out above duties or 2 years experience working as a Computer Network Sales Engineer or Sales Manager with knowledge of Microsoft NT and UNIX. Contact Ms. Rashida Mabari, Shipco Logistics, Inc., 10101 Harwin Drive, Suite 302, Houston, TX 77036 (ph) 713-981-4786 (fax) 713-981-4788

**Database Analyst** (multiple positions) (Midlothian): Oracle database design & administration. Develop packages, procedures & functions in SQL/PLSQL. Create Shell scripts in UNIX. Evaluate interface b/w hardware/software & operational performance of systems. RECD: MS or equivalent experience in job offered. Salary low 60's. Send resumes to: Chaparral Steel, 300 Ward Rd. Midlothian, TX 76065. Attn: Sandy Harrison.

Teradyne, Inc., the world's leading automated testing company for the electronics, communications, and software industries, seeks various levels of Software Development Engineers for our Deerfield, IL office. Requirements include a degree in EE, CS, or related field, level of degree required depends upon position.

If interested and qualified, send resumes to: Human Resources, Teradyne, Inc. 1405 Lake Cook Road, Deerfield, IL 60015.

**SOFTWARE DEVELOPMENT ENGINEER.** Develop new applications for an international business-to-business portal; develop and maintain existing applications; develop and maintain Web Based Telephony Product Management Application. Must have Bachelor's in Computer Science or related field and one year experience. Must have knowledge of Windows, Access, Excel, Word, PowerPoint, SQL, Visual Basic, Active Server Pages, and ADO. Send resumes to USA Global Link, Dept. A, 50 N. Third St., Fairfield, Iowa 52556.

The County of Santa Clara, Information Services has 4 newly-created, professional-level vacancies.

**Information Technology Planner/Architect (2 vacancies):** Creates strategic and tactical IT plans to support long-term business needs and develops the IT architecture. Qualifications: Educ. & exp. equiv. to a Bachelor's deg. in Computer Science, Bus. or related field and 5+ years relevant exp.

**Business Consulting and Project Services Manager:** Manages a group of Senior IT staff responsible for consulting and projects. Determines the feasibility of automation needs. Ensures that IT projects are planned and delivered on time, within budget and meet customer needs. Qualifications: Educ. & exp. equiv. to a Bachelor's deg. in Computer Science, Bus. or related field and 6+ years relevant exp. including 3 years exp. managing 15+ staff.

**Project Support Services Manager:** Manages a group of senior IT staff responsible for applications development methods, data resource management and software quality assurance. Qualifications: Educ. & exp. equiv. to a Bachelor's deg. in Computer Science, Bus. or related field and 6+ years relevant exp. including 3+ years exp. managing a dept/div of 15+ staff.

Benefits include health insurance, vacation/sick leave, tuition reimbursement and paid retirement.

For more information and application materials, call (408) 299-2341. Apply to Santa Clara County Government Center, Employee Services Agency, HR Dept., 70 W. Hedding Street, Elgin, Lower Level, San Jose, CA 95110. Visit our Web site at [www.sccjobs.org/OOE](http://www.sccjobs.org/OOE)

**Software Engineer.** Sought by Englewood Colorado consulting company to work in various unanticipated locations throughout the U.S. Research, design & develop computer software systems for computer applications in conjunction with hardware product development. Analyze software requirements to determine feasibility of design within time & cost constraints. Consult with clients to define needs or problems. System administration, implementation and maintenance. Use of Windows 95/NT, ALX, SQL, ORACLE Visual Interdev, VBScript, JavaScript, C++, C, etc. Master's or foreign equivalent in Computer Science, Computer Eng., Electrical or Electronics Eng., Statistics. Plus 2 years in the job offered or 2 years in a related occupation including Consultant. \$76,000/year, 40 hrs/wk, 8AM-5:00PM. Respond by resume to: James Shimada, Colorado Department of Labor & Employment, Tower II, #400, 1515 Arapahoe St., Denver, CO 80202 and refer to Job Order No. CO 4645355.

**Software Engineer.** Sought by Englewood Colorado consulting company to work in various unanticipated locations throughout the U.S. Research, design & develop computer software systems in conjunction with hardware product development. Analyze software requirements to determine feasibility of design within time & cost constraints. Consult with clients to define needs or problems. Analysis of client specifications and goals. Use of IBM Mainframe, UNIX, COBOL, DB2, CICS and Powerbuilder. Reqs. Master's or foreign equivalent in Computer Science, Computer Eng., Computer Applications, Electric or Electronic Eng. Plus 1 year in the job offered or 1 year in a related occupation such as Programmer Analyst. \$60,000/year, 40 hrs/wk, 8AM-5PM. Respond by resume to: James Shimada, Colorado Department of Labor & Employment, Tower II, #400, 1515 Arapahoe St., Denver, CO 80202 and refer to Job Order No. CO 465312.

**Sr. Systems Analyst** Design, test & implement client/server systems using ORACLE, PL/SQL, PowerBuilder & ProC. M-F: 35 hrs/wk, \$90,000/yr. Reqs: Bach in Comp Sci, Math, Physics or Eng & 5 yrs exp. Employer is a computer consulting company. Relocation required to client sites for periods between 6 months & 2 years. Submit resume addressing specific requirements w/d spec to: AZ DES JS, Attn: 732A, Re: 0479035 POB 6123, Phoenix, AZ 85005-1623 EMP PD AD. Proof of ability to work in US req. if hired.

**Programmer/Analyst** sought by company in Lakewood, CO to work in Lakewood and Germany. Develop image analysis software in C/C++ using MSVC++ and C macro language. Develop drivers for cameras & stages and other hardware components. Maintain interface to German development team. 8am-5pm, M-F: \$57,650/yr. Required: Scientific background (Master) other than computer science, 3 yrs experience in development of image analysis software. Experience in a C macro language and development of C/C++ Windows 32bit programs using VC++ 6.0. Frequent travel to Germany and knowledge of German language. Respond by resume to Colorado Department of Labor & Employment, Employment Programs, ATTN: Jim Shimada, Two Park Central, #400, 1515 Arapahoe St., Denver, CO 80202-2117, refer to Job Order Number CO4653518

**Programmer Analyst.** Sought by Englewood Colorado consulting company to work in various unanticipated locations throughout the U.S. Analyze plan, develop, test & document computer programs. Evaluate user requests & software program requirements for new & modified programs. Write specifications, code, test & debug computer programs. Customize hardware & software to client needs. Use of COBOL, RPG II, SQL, QUERY/400, AS/400, C++, DB2. Reqs: Bachelor's or foreign equivalent in Computer Science, Computer Eng., Electrical or Electronics Eng. or Statistics. Plus 2 years in the job offered or 2 years in a related occupation including Programmer Analyst. \$60,000/year, 40 hrs/wk, 8AM-5PM. Respond by resume to: James Shimada, Colorado Department of Labor & Employment, Tower II, #400, 1515 Arapahoe St., Denver, CO 80202 and refer to Job Order No. CO 4653108.

**Prgrmr/Analyst** Dallas, TX - Participate in dev/mt of entertainment s/ware, apps, work plan & design. Develop user interface screens using Oracle 6.0, UNIX & Windows NT 4.0. Design, code, test & document new comp. apps & develop GUI components using Crystal Reports. Analyze problems & troubleshoot as needed. Prep. bus. rpts., design d/bases & tables. Assist in maintenance & support for mainframe envrmt. Develop enhancements to create reports. Must have knowledge of mainframe environment. Must have Bachelor's degree in Comp. Sci., Engng., Math or related field & at least 1 yr exp. in related position. 40 hrs/wk (9-5); competitive salary/well-desired benefits. Send resume & salary rgtm's to: Corporate Recruiter BLOCKBUSTER INC. 1201 Elm St., Dallas, TX 75270 or careers@blockbuster.com Ref # ISSCW004

**Programmer Analyst:** (6 openings) Apply principles of comp. sci. & MIS in designing & implementing significant enhancements to cmpry's adv. warehouse mgmt. software systems to ensure systems are reliable, understandable, maintainable, efficient and portable; perform requirements analysis for enhancements to company's std. software products; produce system level doc. in accordance with dept. stds.; develop user doc. suitable to hand over to tech. writer; perform preim. designs for enhancements to software systems; produce prod. specs. according to dept. stds.; participate in estimating software product enhancements; perform integration testing for functional areas of responsibility; dev. and maintain Perl programs for various functions like System startup/shutdown, purging, reporting and make/migration type; design, dev. and implement software to support different databases, incl. Oracle, Ingres, Sybase and Informix; design, dev. & maintain industry stds. screens using C, ESQ/L & Escape; dev. applications which access a Ctree Database using IQ; dev. & maintain radio frequency applications for use with LXI, TELXON, SYMBOL & TELELOGIC RF terminals. **Required:** B.S. in Engineering, MIS or Com. Sci. & 1 yr exp. as Programmer. Exper. must incl. req.'s analysis, design, dev/mt., implementation, & enhancement of software systems to support functions of business operations; designing, developing & implementing software to support different databases including Oracle, Ingres, Sybase, or Informix, & warehouse systems development in UNIX environment using C. \$45,500/yr; 40 hrs. wk. 8:00 AM to 5:00 PM. 2 copies of resume (no calls) to: M. Brooks, File C101347, DWE-ALC, P.O. Box 7972, Madison, WI 53707-7972. Reference file #C101347

**Database Analyst** to manage SAP R/3 implementation; develop functional specifications & design requirements for SAP R/3 implementations; develop dbase management system in Oracle & dbase development & connectivity through Developer 2000; convert engineering formulations to format for computer processing, including writing code, using C, Cobol, Fortran & dbase III; analyze and design system dbase to meet client needs; Reqs. Master's in Comp. Sci., Computer, Electrical, Electronics or Civil Engng., Comp. Info. Systems, Mathematics or its foreign deg. equiv. plus 2 yrs exp. in job offered or 2 yrs related exp. as Applications Engr. or S/ware Programmer. Related exp. must include analysis, development, design, writing code & using Cobol & dbase III. 6 mos exp. must include design & development using Oracle & Oracle Developer 2000; \$63,000/yr, 40 hrs/wk, OT as req'd, 8a-5p. Must have proof of legal ability to work permanently in U.S. Send 2 copies of resume & cover letter (no calls) to Illinois Dept. of Employment Security, 401 S. State St., 7th North, Chicago, IL 60605. Attn: Leonard Boksa, Ref. #VIL22345-B. An Employer Paid Ad.

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Qualified applicants should hold a Bachelor of Science degree in Computer Science or related field or equivalent.

Apply w/ resume to Attn: Human Resources Exec. Search, Inc. 15850 W. Bluemound Road, Suite 308, Brookfield, WI 53005 Fax: (262) 782-7533 web site at [www.execsearch.com](http://www.execsearch.com)

**Senior Software Engineer.** Researches, designs and develops computer software systems for numerous applications; designs software within time and budget constraints. Consults with others to evaluate interface between hardware and software requirements of overall system. Employs wide knowledge base of operating systems, programming languages and database systems to collate work of others into unified software product tailored to needs of clients. Researches, designs, develops and implements emerging software engineering technologies and high end web technologies using Oracle, Java, C++, and web technologies. Master's or foreign equiv. Comp. Sci., I.S. Elec. Engng. or related (1) year exp. developing applications employing Oracle, Java, C++, and web technologies. Some overnight travel may be required. 40 hrs, 9 to 5, \$65,000.00 per year. Application by resume only to Colorado Department of Labor and Employment, Employment Programs, ATTN: Jim Shimada, Two Park Central, Suite 400, 1515 Arapahoe Street, Denver, CO 80202-2117 and refer to order number: CO4654088

**Programmer.** Analyzes various internal or client web sites to develop, modify, test and program existing and future web sites to ensure that information displayed and transmitted through such sites is in compliance with various web browsers requirements for appropriate data elements. Modifies sites using HTML, programming as well as C-Perl to adapt software to new and updated user requirement as well as modifying web site structure using various utilities, forms, tables, image maps and adapts such structure to use in Internet by programming in Java Script as well as Java Oracle PL/SQL for database retrieval and access. Requires Master's degree in Computer Science, Mathematics or Statistics. Education to include completion of two projects in the design and implementation of a client/server system using Java for web implementation. Hours: 8:00 a.m. - 5:00 p.m. 40 hours per week at \$42,000.00 per year salary. Two copies of resume to: Char Phrasad, File #C101313, DWE-ALC, P.O. Box 7972, Madison, WI 53707-7972.

### Database Administrator-

Marketing Dept. wanted by Law Firm in Milwaukee, WI. Must have Bachel in Information Systems Analysis & Design & 2 yrs s/ware exp.

Respond to: HR Dept., Hausmann-McNally SC, 6313 West Wisconsin Ave. No. 2000, Milwaukee, WI 53203.



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**The Position**  
Design and development of process automation systems for GE's IT clients using Remedy ARSystem. The position will also involve support of sales efforts. Requirements include: Bachelor's degree and two years of experience with Remedy development. Unix scripting, SQL, client/server, C++ programming, and Business Analysis/Systems. Requirements gathering. Candidates must possess strong application development and communications skills. IT process knowledge a plus (ITIL, help desk, change management, asset management). 50% travel required. Positions available in New York, Minneapolis, Chicago, Atlanta, Boston, and Washington D.C.

**To Apply**  
We offer competitive compensation with an outstanding benefits package and a progressive work environment that encourages professional growth. Send resume and salary requirements via E-mail to [jill.bocock@gecap.com](mailto:jill.bocock@gecap.com) or mail to Jill Bocock, GE Capital IT Solutions, 5353 Gamble Drive, Suite 200, Minneapolis, MN 55416. Reference code PA101 in all replies. An equal opportunity employer.

**GE Capital**  
Information Technology Solutions

**Job # 2031126-Software consultant**-Database administration of Oracle databases, including backup, tuning and maintenance. Also, designs, develops, implements, implements software systems applying computer science, engineering and mathematical analysis using Unix (HP and Sun Solaris), NT, Windows, Netware, PL/SQL, SQL\*Loader, SQL\*Plus, UNIX Shell Script, ERWIN, DESIGNER 2000 and Oracle Application Server. Must have 1 year of experience using Unix, Oracle and SQL\*Lab. Must have Master's degree in one of several listed fields: mathematics, computer science, physics, chemistry or engineering. Will accept a bachelor's degree plus 5 years of progressive professional experience as a computer professional in lieu of Master's degree. \$70,000/yr; 9am-5pm; 40hrs/week. Please forward resume listing above job number to: Terry Kinney, Armstrong County Job Center, 1270 N. Water Street, P.O. Box 759, Kittanning, PA 16201

Computer Consulting Firm based in Connecticut seeks to fill the following job openings in Hartford, CT & Boston, MA:  
i) Database Administrators (multiple positions) - Must have Bach in Comp Sci, Engg or equiv & 2 yrs exp in Database admin with Oracle or MS SQL Server.  
ii) Software Developers (multiple positions) - Must have Bach in Comp Sci, Engg or equiv & 3 yrs exp doing MS applications using C/C++, UNIX, S57, VOIP, SNMP, ISDN.  
iii) Software Engineers (multiple positions) - Must have Bach in Comp Sci, Engg or equiv & 2 yrs exp doing & dvlp internet apps, database applications using VC++ VB, ASP, HTML, JAVA, JDBC, JSP, Javascript.  
Respond to: HR Dept, Talent Consulting Services Inc., 21 New Britain Ave, Ste 204, Rocky Hill, CT 06067.

**SOFTWARE ENGINEER**  
Proven ability in using Oracle Database in a cluster environment for a very large distributed database (VLDDB) system. Demonstrated ability in using Oracle tools, namely, SQL\*Forms, SQL\*Plus, SQL\*Report Writer, SQL\*Loader Pro-C and Developer 2000 advanced packages. Demonstrated ability in writing stored procedures, functions, database triggers, SQL\*Plus Reports using PL/SQL for server-side processing. Strong knowledge in Oracle performance tuning on the client side applications. Job duties are Analysis of current procedures and problems to refine and convert the data to programmable form; determine output requirements; modify existing system to evaluate effectiveness; upgrade systems presently in use; develop, test and implement new software; correct systems/problems as necessary. Requires Bachelor's in Science (or) Math (or) Computers with 2 years of software development experience. 40 hours per week at \$ 75,000 per year. Please send resume to Case # 19990468, PO Box # 8968, Boston, MA 02114.

Proprietary software dev. company is seeking a Software Engineer to be responsible for overall project management, project scheduling & packaging of Visual Workplace products, using Intel Pentium based PCs. Windows95, WindowsNT, GIS/MapInfo, AS/400, MS Project, & Visual Source Safe; provide technical support for release 4.4.5 of the Visual Workplace Graphical User Interface for AS/400 based MAPICS applications; Visual Workplace is an application that provides a uniform & consistent linkage between users & MAPICS applications through an intuitive, point & click interface reading on user PCs which provide an option of running Visual Workplace throughout an enterprise. Qualified applicant must have B.S. or equiv. in Computer Science, Engineering discipline, or Math & 1 yr. relevant exp., to include use of noted skills in job duties. Will accept 3 yrs. exp. for each year short of a 4 year degree. Excellent salary & benefits pkg. Send resume to HR Director, MAPICS, Inc., 1000 Windwood Concourse Pkwy., #100, Alpharetta, GA 30005.

#### SYSTEMS CONSULTANT

Systems Consultant to design, develop, test, integrate and implement computer software for production systems of steel plant in client/server applications, applying principles and techniques of computer science, engineering and mathematical analysis; analyze software requirements for feasibility of design and hardware interface; design and direct software system testing processes; develop and test Oracle 7.3 Database, Power Builder, Star-Designer, Database Optimization, and communication tools with machine level operating system parameters. Requirements: Bachelor's Degree in computers, engineering, or related field and five years experience as a systems consultant or computer programmer. Knowledge of Oracle 7.3 Database, Power Builder, Star-Designer, Database Optimization, and communication tools with machine level operating system parameters. Salary: \$64,800/yr. Working Conditions: 8:00 a.m. to 4:00 p.m., 40 hours/week. Apply: Ms. Barbara Cole, Supervisor, Genome Center Team PA Career Link, 4 West High Street, Waynesburg, PA, 15370. Refer to Job Order Number WEB 87747.

#### Senior Software Engineer

Analyze production requirements. Design, implement, test and integrate software modules. Evaluate and recommend third party software products to integrate with CNT products. Positions require a Bachelor's degree in Electrical Engineering, Computer Science or relevant field, 4-6 years experience in software development, and prior experience with C++ or Java, and Unix and Windows development environments.

Please send your resume and cover letter to: Computer Network Technology, Attn: HR-TP, 6000 Nathan Lane, Plymouth, MN 55442. Fax: (612) 550-8812. E-mail: [recruiters@cnt.com](mailto:recruiters@cnt.com). Equal Opportunity Employer.

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Computer Network Technology

#### System Developer

wanted by Information Tech Firm in Edison, NJ. Must have Masters in Sys Mgmt, Comp Sci or Comp Engg & 6 mos sw dev exp.

Respond to: HR Dept, Strategic Professional Services, Inc., 505 Thomall St, Ste 304, Edison, NJ 08837.

**SOFTWARE ENGINEER:** Ability in administering SUN Solaris Systems to maintain high uptime and providing networking solutions for LAN/WAN connectivity. Ability in using operating systems such as Solaris 2.x, Unix 5.4, HP-ux, IBM AIX, Irix, etc. Guardian os, Windows NT, UnixWare and Novell Netware 4.11. Proven ability in using SUN 4.11. Veritas volume manager, NIS+, Solstice disk suite, Legato to networker, Net backup software, HP SAM manager and IBM smit manager. Demonstrated ability in designing, implementing and administering large LAN/WAN Networks. Job duties are Analysis of current procedures and problems to refine and convert the data to programmable form; determine output requirements; study existing system to evaluate effectiveness; upgrade systems presently in use; develop, test and implement new software; correct systems/problems as necessary. Requires Bachelors in Engineering (or) Math (or) Science (or) Computers with 2 years of software development experience. 40 hours per week at \$ 78,000 per year. Please send resume to Case # 19990376, PO Box # 8968, Boston, MA 02114.

**SR SOFTWARE ENGINEER** FOR AN OBJECT ORIENTED DEVELOPMENT SOFTWARE FIRM IN BOSTON, MASS. RESPONSIBILITIES INCL: DESIGNING AND DEVELOPING C++ CODES TO EXTEND THE ABSTRACT CODE GENERATOR (ACG) CAPABILITIES, DESIGNING AND DEVELOPING C++ CODES TO EXTEND THE ABSTRACT CODE GENERATOR (ACG) CAPABILITIES, PUBLISH USER-DEFINED MODELS, OTHER DUTIES INCL: MANAGING A SOFTWARE TEAM OF 4 ENGINEERS; SCHEDULING AND IMPLEMENTING SOFTWARE PROJECT PLANS; & MODELING BUSINESS OBJECTS FOR CLIENT PROJECTS. M.S. IN ELECTRONIC ENGINEERING/SYSTEMS ENGINEERING NECESSARY. 2 YRS EXP IN THE JOB OFFERED OR 4 YRS EXP AS A SOFTWARE ENGINEER. MUST HAVE KNOWLEDGE OF OBJECT ORIENTED MODELING & DESIGN. 40 HRS PER WK, MON THRU FRI, 9AM TO 5PM. SALARY \$71,200 YEARLY. MUST HAVE PROOF OF LEGAL AUTHORITY TO WORK IN THE U.S. SEND RESUME IN DEPLICATE TO: CASE # 19993313, PO BOX #8968, BOSTON, MA 02114. NO FEE CHARGED

#### SS7 Signaling Manager

In this position, you will determine system requirements, architect, design and develop carrier signaling functionality and perform thorough system testing. Candidate must utilize specialized knowledge of telecommunications-related software and technology, application redundancy and replication and highly available/fault tolerant systems. Position involves scheduling and managing development activities and features selection to ensure that products meet telecommunications system software requirements as defined by Telica's system architect. Please send your resume, by e-mail, to: [pcrowley@telica.com](mailto:pcrowley@telica.com). Fax to 508-480-0922. Mail to: Paul Crowley, Telica, Inc., 734 Forest Street, Marlboro, MA 01752. EOE

**Full time Senior Programmer Analyst** to develop, modify and maintain applications that are customized or standardized using ER Diagram, PL/SQL, Oracle Developer 2000, Forms 4.5, Reports 2.5, Oracle 7 database. Must have a Bachelor's degree in Computer Science or foreign degree equivalent. Must have two years of experience in the job offered or two years of experience in a position with same duties. Salary \$73,000/yr. Send resume to: DataScan Technologies 1105 Sanctuary Parkway, Suite 190 Alpharetta, GA 30004. Attn: Kimberly Donohue

**Lead Software Engineer**  
Perform complex development programming and analysis for health information systems software. Provide technical support and lend expertise to product designers in the area of technical feasibility and direction. Serve as technical lead and consultant to a programming team in developing software solution at multiple alpha and beta test sites. Create team lead development processes and procedures. Port software to Windows NT from Windows 95 code. Demonstrate ability in developing graphical user interfaces and client/server environments. Knowledge of Visual Basic, Windows NT, Windows 95, SQL and ActiveX/OLE technologies. 40 hrs/wk (8 to 5); \$72,950/yr. Send two resumes/responses to Case #19984063, Box 8968, Boston, MA 02114.

**Computer Programmer Analyst:** Plans, develops, tests and documents program requests for new/modifications, convert project sequence into sequence of instructions for coding, enter codes/commands to run and test program, detect/modify syntax/logic errors, analyze programs to increase efficiency, write manual for and train users. Oracle, Visual Basic, Req: B.S. Comp. Sci. and 2 yrs. exp. in job offered. 40 hrs/wk, 8-5pm. Job in FL. Send resume to Allen Systems Group, Inc., Corporate Recruiter, 1333 Third Avenue South, Naples, FL 34102.

**SOFTWARE ENGINEER:** Experience in software design, development, testing & implementation in client server applications using GUI event driven programming. Proven track record in System Analysis and design using Automated Data Processing and Electronic Data Processing. Demonstrated ability in designing and developing applications using DBase IV and FoxBase. Working knowledge in DB2, CICS and COBOL programs using DB2, CICS, COBOL, MF COBOL and XDB B.S. or equivalent. Job duties are Analysis of current procedures and problems to refine and convert the data to programmable form; determine output requirements; study existing systems to evaluate effectiveness; upgrade systems presently in use; develop, test and implement new software; correct systems/problems as necessary. Requires Bachelors or equivalent in Computers, Math, Science or Engineering with 2 Yrs of software development experience. 40 hours per week at \$ 56,000 per year. Please send resume to Case # 19983325, PO Box # 8968, Boston, MA 02114.

**SOFTWARE ENGINEER:** Developing Data Warehousing project using Oracle as back-end. Ability to use Informatica and Microstrategy DSS Agent in developing reports for Data Warehousing project. Ability in using Oracle Designer/2000 for developing logical and physical designs. Knowledge in using Proc. Enterprise Manager, SQL\*Lab, Oracle utilities, UNIX, MS-DOS, Windows 3.0/95/NT and XENIX operating systems. Job duties are Analysis of current procedures and problems to refine and convert the data to programmable form; determine output requirements; study existing system to evaluate effectiveness; upgrade systems presently in use; correct systems/problems as necessary. Requires Masters in Computers with no experience required. 40 hours per week at \$ 72,000 per year. Please send resume to Case # 19991193, PO Box # 8968, Boston, MA 02114.

Software Engineer to provide on site software consultancy to analyze, design, develop, test and implement manufacturing and industrial software applications using C/C++, Java, ASP, Visual Basic on operating systems UNIX, Windows 95/NT/Workgroups in client/server computing and object-oriented environment; design, develop, test and implement software for the Internet, Intranet, e-commerce and Business to Business applications using HTML, DHTML, VB Script, SQL, Java Script and Java Applet. Interface with IBM mainframe databases, IMS and DB/2 using Java on Windows 95/NT, MS SQL Server, MS Access and Oracle. Requires Master's degree in Engineering/Mathematics/Computer Science and two years experience. Salary: \$60,000 per year. 8:30 am to 5 pm, M-F. Mail resume to: President, Yash & Lujan Consulting, Inc., 7550 H.W. Street, Suite 940, San Antonio, TX 78229.

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**Senior Engineer for TeleTime for Timekeeper Client/Server:** Immediate responsibilities & project goals: work w/Product Marketing & Field Service to refine product requirements & translate to functional specifications; work w/Software Quality Assurance (SQA) to review SQA plans, develop testing tools, & resolve problem reports; contribute to design of overall architecture for TeleTime multiple server configurations; design & develop the daemon server application, a software program written using Microsoft Visual C++ which communicates between TeleTime servers; design & develop daemon functions for use synchronizing TeleTime databases & voice prompts among multiple TeleTime servers; design TeleTime database modifications to optimize synchronization. Medium & long term goals include: further integrate TeleTime as part of Timekeeper Client/Server product suite; extend & generalize the Interactive Voice Response (IVR) capabilities of TeleTime for use in other company products (Home Health Care, TCO/Wire); provide IVR access to other common tasks w/in the Time & Attendance Application domain; identify, evaluate & incorporate emerging standards & technologies for Telephony & IVR based solutions. Requirements: BS in Computer Science or the related or the equivalent; minimum 3 years exp in the telephony/IVR systems field. Also reqs exp in writing telephony/IVR applications; exp w/voice processing board APIs; exp w/high level telephony application building environments; exp in writing NT service applications; exp in the use of MS Visual C++ & MFC (Microsoft Foundation Classes); & experience w/Windows NT. 8:00 a.m.-5:00 p.m., 40 hrs/wk. \$70,000/yr. Submit 2 resumes to Case# 19983434 POBox 8968 Boston, MA 02114.

**Senior Software Engineer** to apply object-oriented analysis to design & develop payment applications in C++ and Java using distributed object technology. Responsible for all aspects of system development & product quality. Duties include database design, maintenance, implementing database queries & stored procedures; server design & implementation; designing & implementing interfaces exported by server & using CORBA for establishing communication between servers (Orbix for C++ servers & OrbixWeb for Java code). Also responsible for version control of system, release engineering, including global builds & distribution of application on test & production platforms; designing & maintaining EDI/application translation maps, setting up communication with remote customer machines using 3rd party products & setting up secure data exchange with customers using secure socket layers & encryption. Requires BSc in CS or EE and 5 years experience in job offered or 5 yrs exp in design of databases & database queries. Alternatively, will accept MSc in CS or EE and 3 yrs exp in job offered or 3 yrs exp in design of databases & database queries. Candidate must also possess demonstrated expertise in object-oriented analysis, design & programming; demonstrated expertise with distributed objects & object broker architecture using CORBA or QDC; and demonstrated expertise designing multi-threaded Servers on UNIX platforms & writing multi-threaded programs using C++. Sal: \$69,800/yr. M-F, 9A-5P. Send 2 resumes to Case# 19983276, PO Box 8968, Boston, MA 02114. EOE. Applicants must be U.S. workers eligible to accept full-time employment in U.S.

#### Member of Technical Staff.

Provide overall responsibility for administering and maintaining a complex computing environment that integrates diverse UNIX and Windows NT computing environments. Guide junior administrators in providing continuous support for 100+ engineers working in a fast-paced, high-pressure development environment. Oversee and perform administration, installation, integration and maintenance of hardware, software and network components; system tuning; software updates; backups; and administrative support. Administer and configure development tools including revision control/configuration management software, and customize software defect tracking systems. Perform performance tuning and configuration of relational database management systems and develop automated procedures for database backup and recovery. Plan, install and administer local and wide-area multi-protocol data networks and network services. Develop automation tools and procedures using scripting and programming languages and database triggers and stored procedures. Requires MS in CS or related field plus 1 yr exp. in job offered or related occupation such as Systems Administration. \$75,000/yr. 40 hrs/wk, 8-4:30pm.

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#### Software Engineer

wanted by Florida based Software Consulting Firm for job loc throughout US. Research, design, develop software system using VS COBOL II, CICS, DB2; develop & direct software systems using programming & documentation using VSAM, JCL, QMF & SPURF; formulate & design software system; analysis/dsgn/coding/optimization, validation testing quality assurance. Masters Comp Sci/Engg/For. Deg equiv & 2 yrs in job offered or 2 yrs as systems analyst. Respond to: HR Dept, IFM Services Inc., 313 North Country Club Blvd, Boca Raton, FL 33487.

#### Project Manager

to analyze, design, develop & manage production of new software applications & enhancements to existing applications to support initiatives of company's Systems Department. Work directly w/business units to gather & document requirements. Duties include object-oriented (OO) analysis; database schema design; programming Microsoft Windows-based graphical user interface (GUI) and architectural components in Visual C++; design key architectural components and systems; estimate and schedule; and produce project plans. Also manage development teams & guide development direction. Requires Bachelors degree in CS or EE and 5 years experience in job offered or 5 yrs experience in software development including 2 yrs as Team Leader or Project Manager. Candidate must also possess demonstrated expertise developing GUI using C++ or Visual Basic; demonstrated expertise in OO design and analysis & demonstrated expertise in architecture design. Sal: \$83,200/yr. M-F, 9AM-5PM.

Submit 2 copies of resume to ID #: 99-096, RI Dept. of Labor & Training, ATTN: T. Salabert, 101 Friendship Street, Providence, RI 02903-3740. EOE. Applicants must be U.S. workers eligible to accept full-time employment in the U.S.

#### SOFTWARE & DATABASE POSITIONS

**BROOKS AUTOMATION, INC.**, a global, public company engaged in the design, development, manufacture and sale of material handling robotic and other hardware and software systems to technology manufacturers, seeks to fill a number of Software Engineer and Database positions at various levels of responsibility at our location in Chelmsford, MA.

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Please mail or fax your resume, indicating Reference Code "IMSIP", to: Brooks Automation, Inc., ATTN: Mr. Susan Sacca, Human Resources, 15 Elizabeth Drive, Chelmsford, MA 01824. Fax: 978/262-2508. Visit our website at [www.brooks.com](http://www.brooks.com). Brooks Automation is an Equal Opportunity Employer.

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#### ROVING APPLICATION ENGINEER

Support the company's existing & future Signal Integrity (EDA) software, function as a specialist in the use & application of the company's software in the EDA marketplace; perform pre & post sales support of customers incl. evaluations, software benchmarking & high level tech. support; provide on-site & telephone support of customers experiencing problems w/software or its application to a particular application; provide assist. to customers to learn new software or transition to upgraded sys; extensive travel to provide on-site demos, presentations & training for the company's products in support of the sale & mktg. efforts; provide first line interface between customers, divpt. staff & mgmt. personnel to guarantee customer rmts. are met in divpt. new or upgraded products. B.S. in Electrical Engrg. plus 2 yr. exp. in either job offered or as Mktg. Eng., Elec. Eng., or Quality Contr. Eng. reqd. Must have knowledge/exp. with signal integrity, 2D & 3D parasitic extraction tools, Engrg. Design Automation (EDA) software & PCB (Printer Circuit Board) & IC (Integrated Circuit) package design, working knowledge of basic electromagnetics. High mobility preferred. 40 hrs/wk, 8 am - 5 pm, \$100,000/yr. Qualified applicants report/submit resume to: Anthony Gebicki, Mgr., Westmoreland County Careerlink, 300 E. Hillis St., Youngwood, PA, 15697-1808. Refer to Job Order WEB87989.

## Senior/Staff Internet Network Engineer

— This is a challenging role in Portland, Oregon that involves architecting, engineering and operating a scalable Internet infrastructure including several "Operations Centers" and numerous "Points-of-Presence" (POP) spanning multiple geographies and networks.

As part of the engineering design and implementation organization, the successful candidate will lead the design of networking and associated subsystems.

Requires at least a BS in electrical engineering/computer science/engineering; MS or Ph.D. preferred. You must have a strong educational and hands-on background in networking protocols and experience with a major backbone provider. Design experience with routers, Layer2/4 switches and other appliances is helpful, preferably Cisco; CCIE desired. Experience with BGP, EGP, IGRP and other relevant protocols is essential, as well as hands-on experience designing/deploying WANs involving ATM and SONET technologies. Expertise with state-of-the-art networking technologies and products including IPv6, Gigabit Ethernet and NGI (next generation Internet) initiatives are necessary, along with the ability to assist operations with setting up "spam" filters and resolve routing issues with major carriers. Exposure to security-related challenges, including firewalls and designing DMZs (De-Militarized Zones) is a must. The preferred candidate will also demonstrate strong awareness of manageability, system management (Tivoli, OpenView, Unicenter TNG, etc.) and network management issues (SNMP, ICMP and related protocols and implementations). An understanding of issues with network programming (TCP/IP, Sockets, Winsock, etc.) and participation in industry organizations like NANOG are also a plus.

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**dave.woolsey@intel.com**

Please include your resume in the body of your e-mail, NOT as an attachment. You may also mail your letter quality resume to Intel Corporation, Professional Opportunities, Staffing Dept. NBG304, P.O. Box 1141, Folsom, CA 95763-1141.

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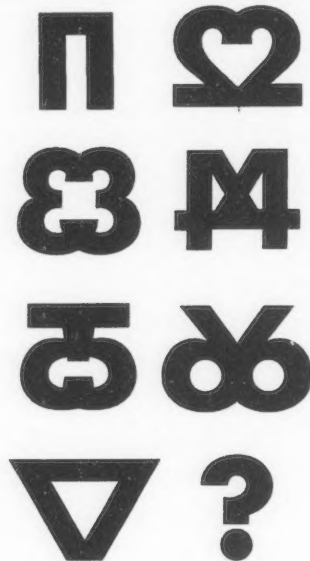


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# Diversity in IT Careers

Anyone walking through an IT organization or dot-com company knows that diversity runs thick. As noted in a recent *New York Times Magazine* report (March 19, 2000), "The hallway traffic in any major technology firm is more racially varied than in other institutions in the country."

One-time musicians and artists rub elbows with computer scientists. Lunchroom conversations are a unique blend of languages. And the way people work and interact is as diverse as the people gathered around the table.

Fact is, most experts tell corporate leaders that the best and fastest way to reach new levels of solutions and creativity is through diversity. What's important is that everyone shares a common goal or agenda. Just as important is assuring that we nurture and preserve this rich diversity if the speed of the Internet is to continue its momentum. These companies are offering diversity in terms of culture, but also in terms of the truly cool projects they offer to prospective employees.

## AdKnowledge An Engage Company Palo Alto, CA

As e-commerce fully engages, the need for advertising and marketing in the web world gains relevance. AdKnowledge develops outbound web marketing services that include data mining, analysis and provides a web-based tool to plan, buy, traffic, target and report results of web advertising efforts.

Mary Peredia, human resources director, says this mission makes for an operation requiring people whose diversity is reflected not just in skin color, but in the way they think, the experiences they've had. "Through our diversity, we can think as a whole," says Peredia. "Without that wholeness and diversity, some piece would be overlooked or missed."

This philosophy plays out in the way AdKnowledge employees work. Groups of diverse people form around projects and customer requirements. "The idea is to bring together people who accomplish work in different ways, who think, do and say things differently. Together, we believe, they bring a broader range of ideas to assist the group in well thought out results," says Peredia.

Peredia says this work environment shows. "Applicants report, after visiting our site, that they can feel the energy – people are sitting in groups, animatedly discussing their work, driving toward answers. This is a place that values having fun while working hard."

In hiring new employees, Peredia keeps a watchful eye for technical talent, but also for attitude. "We are willing to step out of the classical employer mode for someone who has the attitude, the energy. We have people on our staffs right now who are in college. The idea is that we'll provide the challenge, and we'll mentor and help you develop skills along the way."

Currently the company has a variety of job openings – from programmers and web site developers to campaign



managers and system administrators. "Our perfect candidate is one who has energy, attitude and the desire to excel," says Peredia.

## Global Crossing, Ltd. Rochester, NY

From telecommunications services to IT products that help customers manage their telecommunications services, Global Crossing is developing a host of products and programs that provide challenges to information technology professionals.

However, in the midst of mind-boggling growth, company executives see a stark reality: it is one thing to attract people to your company by the very nature of the technical adventure. It's another entirely to keep them. Thus, three-year-old Global Crossing has embarked on an effort to create a culture that welcomes diversity, respects individuals and provides the opening for individuals to fully engage their creativity and skills.

Global Crossing is best known for building and offering services over the world's first global fiber-optic network. The network, which is adding approximately 50 miles every day, will serve five continents. Another business in the Global Crossing family, Global Center, is a leading Internet service business. Its customers include many of the largest and most densely trafficked sites on the web. Earlier this year, Global Crossing announced yet another venture, in partnership with Microsoft, to build the first pan-Asian network and to offer broadband services to the Asia Pacific region.

"As we pursue this aggressive business, diversity is part of the fiber of our business construct," says Marie Y. Philippe, head of corporate culture management, reporting to the CEO. "This is not a matter of meeting numeric diversity requirements but of how we think. We need people to come from different angles to approach a problem."

We've found that when you bring diverse people together – people with different life perspectives – you arrive at conclusions faster," she adds. "We are looking beyond labels and categories and truly valuing mental diversity."

The need for additional skills and talents increase. Philippe says currently the company is looking for individuals with skills in network design, installation, implementation, programming, field engineers and people who understand the

telecommunications industry and can develop new models for its service.

"Potential clearly is the reason a talented person would choose to work at Global Crossing," says Philippe. "There is personal potential – the company is paying for eligible employees to pursue their executive MBA (through the Simon School of Business at University of Rochester) and they have every Friday off for two years so as not to take away from personal or professional time." The company also offers distance learning options, again providing employees with time to actually complete the studies.

"The second type of potential is your career," says Philippe. "We are a compressed organization, without a lot of layers. Anyone with talent who comes into this company has the opportunity for a high degree of visibility and to attain a great deal professionally."

## The Longaberger Company Columbus, OH

You don't have to guess that Longaberger is a different place to work, just by looking at the corporate headquarters building. It's shaped like one of the classic market baskets that has brought Longaberger worldwide fame. The creativity of the architecture is just part of the company's effort to provide a creative, supportive environment.

"People come first here," says Dave Lucas, lead software architect. "You become part of the company family, and our goal is to create an atmosphere where we share dreams and visions."

Mary Wyrick, an IT director, says the dreams and visions are the result of people. "In order to build visions, it is necessary to have a diverse workforce, where there is a key focus on respecting differences."

These shared dreams provide the common thread in a highly diverse workplace. Longaberger's CEO is Tami Longaberger, daughter of founder Dave Longaberger. The vice president for IT is also a woman, and directors of development within the IT organization represent a rich blend of males and females, backgrounds and ideas.

Currently, the hand-made basketmaker is offering its IT staff a full range of challenges – from e-commerce sales to distributed computing architecture and web browser-based technologies. "We are one of the few companies in Columbus using Enterprise JavaBeans and going this route on in-house development projects," according to Scott Brown, IT director. The company is piloting e-commerce efforts and is building the architecture for an on-line order entry system using Java, EJB, XSL and XML.

In addition, the company is building an enterprise-wide data warehouse from the ground up. "This is a strategic initiative for ensuring continued revenue growth at Longaberger," explains Katrina Mossman, IT director. The Decision Support Team is determining the technical infrastructure (DBMS, hardware and tools: ETL, Cleansing and OLAP) for the Business Intelligence environment at Longaberger.

To handle these projects, Longaberger's IT leaders are looking for people with skills in design and development, Java, XML, XSL and UML. "It's also important to be able to work on teams, to be creative and to be good communicators,"



## Diversity in IT Careers

says Helena Buehler, IT director. "We are looking for people who are fun-loving, who have a good sense of humor and who understand our commitment to a family-friendly environment."

"We are a best-of-breed IT shop, where creativity and flexibility are key," adds Brown. "Sometimes we buy and sometimes we build systems, depending on the business need. Subsequently, we are looking for technically diverse people who have worked in all environments from mainframe to mid-range to client/server, and who are adept at integrating multiple systems."

### MasterCard International Technology Hub St. Louis, MO

It's sometimes easy to forget some of the giants whose heft in the technology world is huge. MasterCard is among these, handling 25 million authorization transactions a day, which translates to 1.04 million per hour or 17,361 per minute or 289 per second – in 179 different currencies!

"As a global payments company, with one of the world's most recognized and respected brands, we understand, value and leverage both the differences and similarities of our employees," says Janice Burns, vice president of global diversity. "MasterCard's diversity effort is driven by our need to attract, develop and retain the best talent. We are customer driven. We place a priority on developing new products and delivering value-added services to member financial institutions and cardholders in 210 countries and territories. Our diverse workforce provides MasterCard with new insight and helps forge these relationships."

Burns says simply stated, the company is looking for the most qualified people. The company is involved at a staggering level in product innovation, electronic transactions and e-commerce. "These candidates are innovators whose skills typically stretch beyond technology and the financial services industry," she says.

Ongoing professional development is one of the critical components to MasterCard's multifaceted diversity effort. "We focus on three growth areas," says Burns. These include building skills, transferring knowledge and leveraging culture. Every technical employee completes 60 hours of training each year in subjects ranging from the "Business of Bank Cards" to highly technical skills classes. "We've found employees also benefit from taking advantage of rotational programs where they gain new skills by taking on different roles," says Burns.

Fully 40 percent of MasterCard's technical employees were referred to the employer by family or friends, pointing to success with programs. "We need people who have strong communication skills, excel as part of a team and possess technical skills including systems development, strategic architecture, Lotus Notes, network engineering and other skills related to transaction processing."

"Our developers work on our global transaction processing systems and network managing projects involving both mainframe and PC-based applications, as well as MasterCard's sophisticated internal systems," Burns says. The company's technology hub is located in St. Louis.

### PeopleSoft Pleasanton, CA

In the young world of enterprise solutions, PeopleSoft is among the mature institutions, providing customers with e-business and analytic applications for human resource management, financials, distribution, manufacturing, supply chain and customer relationship management (CRM). With

more than 4,000 customers, the company provides a full range of expertise for multiple databases, operating systems and e-business applications.

As a company that is both mature and leading-edge in the IT world, PeopleSoft knows the value of differing views and ideas and people. "From a high level, what's important is that we recognize everyone is unique and that this is respected," explains Kimberley Holeman, compliance and diversity program manager. "This philosophy plays out in the people who work here. They give us the most important competitive advantage that we have – the ability to meet and more importantly anticipate our customers' future needs."

The company's philosophy also shows up in its values – which include integrity, intensity, accountability, fun and innovation. "Diversity is an element in each of these," explains Holeman. "For instance, in valuing innovation diversity affects our problem-solving ability and the very nature of information technology. The focus of every job in IT is about solving problems, sometimes on the fly. That's not possible unless there's a range of different approaches and backgrounds. Studies show that problem solving within a diverse group occurs 25 percent faster than within a homogeneous group. We've certainly found that to be the case at PeopleSoft."

Holeman insists that diversity is not a term that can impose limitations. "We must not limit the concept of diversity to gender and ethnicity," she explains. "To do so means eliminating the importance of diversity in backgrounds, experiences and work styles. We try to recognize the whole person, not narrow to things that are easy to measure."

The company's approach to diversity is particularly critical as it has expanded globally. "Information technology helps us cover the globe – our IT associates are supporting a worldwide network and need to be able to work in that environment."

While values and customer challenges provide the common thread, PeopleSoft encourages ongoing diversity through its approach to career development. PeopleSoft University allows employees to stretch and acquire new skills, and tuition reimbursement is provided for any degree program, not just technical degrees.

"The idea is that all employees be able to expand and develop their own opportunities and through education they are empowered to continue on their career path," adds Holeman.

Don't mistake Holeman's words as a replacement for action – the company is aggressive in its web search for savvy professionals, works extensively with professional organizations and participates in scholarship/intern programs. Holeman's reach extends to pre-college, with high school students in the Oakland (CA) area learning to repair computers as a way to earn their own computer. The company also has donated software and PCs that wired the entire Oakland Public School System.

Construction was recently completed on PeopleSoft's new data center, and the company is taking on a new strategy: As an Application Service Provider (ASP) PeopleSoft will provide customers with the IT structure within the company's systems so customers can avoid the cost. "We'll then be able to deliver our software and services in a way that builds up the customer company's capabilities without draining its resources," explains Holeman.

To support its new and existing strategies, PeopleSoft is seeking people at all levels of the operation, to include new graduates as well as senior managers. Positions are

available in web networking, program development and for people who have experience in human resource management systems and financial systems. "Technical ability is a key piece, but there's a great deal of flexibility around that."

"We're looking for a specific profile," says Holeman. "It's not necessarily the number of years you've worked but your potential. We want people who have come a long way in a short time – at the speed of the Internet."

### GE Power Systems Atlanta, GA/Schenectady, NY

When Sharon Daley, manager of organization and staffing at GE Power Systems, discusses diversity, she shifts into a discussion of talent. "Diversity is one of the cornerstones of our processes that relate to talent development," she says. "It's a very thorough process where we look at people, from the individual contributor level to executive level, identifying strengths, business needs and potential. We coordinate this with a special focus on diverse talent."

The process provides a roadmap to develop and mentor people for their next move and future moves within GE. The result is an organization that carefully manages global diversity (an important aspect for GE Power Systems, which has 50 percent of its sales outside the United States), as well as a more traditional, U.S. perspective of diversity. With more than 40 percent of newly hired people in 1999 reflecting some type of diversity, GE Power Systems also uses employee forums to share career best practices and to provide visibility of individuals to hiring managers and executives.

The IT challenges within GE Power Systems are as intellectually intriguing as they come. The business provides power generation equipment to utility companies and industrial customers. In addition to traditional equipment, the business offers a wide range of services, from monitoring and diagnostic systems to plant optimization and inspection, repair and installation. "You'll be involved in a broad scope of work – infrastructure, enterprise systems, e-business and e-technology. We're working on exchange systems and project collaboration tools, as well as customer self-service tools," explains Daley.

The business uses e-auctions to source direct and indirect materials. "We're now looking at how we can do this to aggregate buys for our customers," adds Daley. "IT professionals will be figuring out the architecture and interacting with customers and suppliers, which allows you to broaden your own perspective of the business equation." Another project involves development of an online tool that allows engineers at GE, the customer and the suppliers to exchange engineering drawings, making changes simultaneously and improving response time. "You won't be viewed as a backroom resource here," Daley says. "Your work, the applications our IT group develops, are used day in and day out by our customers and suppliers."

Daley recruits high achievement new college graduates, looking for those who have distinguished themselves through special activities and projects. She also looks for experienced IT professionals who are results oriented and have a demonstrated track record of achievement. GE also offers its own IT training program for people who may not have a classic IT background. "We need people who have the ability to lead organizations, who are process focused and who can strategize where the business will go in the future," Daley says. "When you choose GE Power Systems, you're choosing GE and its 11 businesses. In IT in particular, GE opens up to you – you are a business resource but also a corporate resource and will have opportunities beyond Power Systems – with medical, aircraft engines, industrial systems and other businesses."

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# Privacy Policies Missing On 77% of Web Sites

*Survey shows improvement, but many still lack rules on sharing consumer data*

BY DEWAYNE LEHMAN

**W**EB SITES are increasingly informing consumers about what they will do with the personal information they collect, but 77% of the 30,000 busiest sites still don't have a stated privacy

policy, according to a survey released last week.

The low rate of privacy postings is an improvement over the 1998 findings of the Federal Trade Commission, which held that 85% of the 1,400 sites surveyed collected personal data but that only 14% of them informed consumers about

their data-sharing policies.

"It's a gradual improvement, and now it's up to the industry to take the next step," said Timothy Kane, director of privacy at Enonymous.com, which conducted the survey. Enonymous.com in San Diego offers privacy-related products and services.

Among the 1,000 most heavily trafficked Web sites, 63% post some type of policy, the survey said. However, many of those sites don't offer a lot of

protection. The survey rated sites on a four-star system, with only 6% earning the top two ratings.

Enonymous.com's findings come amid growing debate about Internet privacy, and they suggest Web sites may be taking consumers' concerns to heart.

Oracle Corp. still doesn't have a privacy policy on its site. But since last year, it has had an "interim" notice posted that informs visitors that it's working on one. Joseph Alhadef, senior director of global public policy at the Redwood Shores, Calif.-based company, said Oracle is incorporating policies for various sections of its Internet site into a single statement for its main page.

"Users want to know [there's a privacy policy] when they go to a Web site," he said.

Nokia Corp. is also struggling to develop a unified privacy policy. The Nokia.com site has a posted policy, but the company's main home page, Nokia.com, doesn't. Nokia is formulating a global privacy policy that takes into account the legal requirements of all the countries in which it does business, a spokeswoman said.

At Newton, Mass.-based Cambridge SoundWorks Inc., company officials have another explanation for not having a posted privacy policy: Its site doesn't collect visitor data.

"It's an informational site to raise product awareness," said Web production manager Ann Marie Alves.

But the company's Internet e-commerce spin-off, Hifi.com, has had a privacy posting since it launched last fall, Alves said.

Sites that don't compile visitor data have all the more reason "to put up a policy anyway," Kane said.

Though more sites are posting their policies, the statements generally don't protect consumers' interests, privacy advocates said. Kane noted that "many sites" use "slippery language" to reserve their rights to share consumer data.

"The survey accurately reflects that privacy policies are not delivering a lot of privacy," said Jason Catlett, president of watchdog group Junkbusters Corp. in Green Brook, N.J. ▀

## Consortium Plans Privacy Guidelines

A new organization that plans to set Internet privacy guidelines and force its members to comply with them was greeted with skepticism by privacy advocates.

The Personalization Consortium, based in Wakefield, Mass., announced its founding on April 5 by 26 companies that represent a mix of established and start-up businesses, from American Airlines and KPMG Consulting LLC to DoubleClick Inc. and E.piphany Inc. Most members are vendors.

The group's stated goal is to promote standards-based development of Internet personalization technology and the ethical use of it. As part of its efforts, the consortium will develop privacy guidelines and require its members to undergo an independent audit to ensure that they abide by them, said Bonnie Lowell, chief technology officer at the consortium and CEO of YouPowered, a New York-based personalization start-up.

The consortium's initial guidelines include providing consumers access to their personal information, "responsible" linking of online and off-line information, and criteria for opting in or out.

The guidelines, however, did little to persuade privacy advocates that the group will protect consumers.

A key issue is how the consortium will handle the linking of online and off-line information. Lowell said linking the two sources of data should be done in a "cooperative, permission-based manner." But Jason Catlett, president of Junkbusters Corp. in Green Brook, N.J., said the consortium doesn't go far enough.

"This looks like an attempt by DoubleClick to provide cover for what it's already doing," he said.

"Real standards" are needed, not more self-regulation, said Marc Rotenberg, executive director of the Electronic Privacy Information Center in Washington. "We need to get beyond the public relations and pass some legislation," he said.

Continued from page 1

## Web Sites

channels in different databases, so they can figure out how to use that data to effectively personalize content, promotions, marketing campaigns and customer service for their customers, analysts said.

"You're seeing an awakening to the possibilities," said Seamus McAteer, an analyst at New York-based Jupiter Communications Inc. He noted that there is a greater appreciation for "the value that can be extracted from pulling together the various silos that [compose] the typical data architecture of the Web venture."

But companies that have used personalization effectively caution that there are still tough technical challenges.

Jamie O'Neill, chief operations officer at Austin, Texas-based Garden.com Inc., uses transaction information and data that users voluntarily provide to deliver to customers all sorts of useful content, including regional newsletters, tips on gardening in dry or wet climates and even Princess of Wales rose sales promotions.

O'Neill cautions about the difficulties in delivering Web content really fast in real time.

"You have to build really robust data warehouses. Your analytics engine has to be really

good to make sure you're clustering intelligently," O'Neill said, adding that there are human challenges, too. "You have to have a lot of really smart people" who understand data analysis and marketing.

SmarterKids.com Inc.'s site wouldn't exist without personalization. The Needham, Mass.-based company makes product recommendations for parents based on surveys they fill out or on test results that provide information about their children's learning styles. The company then uses the rich profiles stored in its database to make product recommendations.

SmarterKids.com continually expand product attribute tags so that undesirable items can be screened out. For instance, if a parent doesn't want competitive games, those products wouldn't be recommended.

But CEO David Blohm recognizes the limitations of the technology.

"A lot of it is still guesswork," he said. "Looking at all that data, you have to make some inferences. You have to ask the right questions. And you've got to be smart about what you're asking the data to tell you."

For many online retailers, the technology has nothing to do with their decision to take a gradual approach to personalization. They think the risk of delivering content that might puzzle or even alienate cus-

tomers is still too high.

"I feel very strongly that personalization gone wrong will do more harm than not doing anything at all," said Sally McKenzie, director of merchandising and operations at Eddie Bauer Inc.'s interactive media division in Redmond, Wash.

Eddie Bauer allows visitors to customize their shopping experience by storing their addresses for faster checkout, setting up wish lists and offering a special event reminder service. The Spiegel Inc. unit has plans to expand, letting customers store addresses of gift recipients and indicate products they would like to see.

McKenzie noted that "apparel is a tricky category" and that her company is still in learning mode. With books and CDs, a retailer might be able to predict other artists a customer might like, based on past purchases. But just because a customer bought five sweaters doesn't mean he wants to buy another one, McKenzie said.

"We've been cautious because our products are unique and different," said Kathryn Grant, a senior manager of Internet strategy at Sharper Image Corp. in San Francisco. "We know that just because you bought a Turbo Groomer the last time you were here doesn't necessarily mean you wouldn't want to buy the talking [crystal] ball." ▀





FRANK HAYES/FRANKLY SPEAKING

## Got programmers?

**I**N GERMANY, politicians are fighting over whether to allow tens of thousands of foreign programmers into the country in the face of a shortfall of IT professionals. Left-wing trade unions and right-wing anti-immigration politicians are lobbying against letting in the foreign IT workers, most of whom would probably come from India.

That sounds a lot like our current debate about increasing the number of temporary visas for high-tech workers, doesn't it? But get this: In Germany, people are complaining that their IT labor gap exists in part because so many German IT professionals have been hired away to work in the U.S.

Yes, the IT labor shortage is now officially a worldwide problem — and we're now officially a major cause.

It isn't just Germany. Ireland, France, England, Japan and Canada are all short of IT workers. Their schools aren't cranking out enough technologists for IT shops and e-commerce start-ups, any more than ours are. The few places with more IT people than they need — such as India and Russia — can't come close to making up the difference.

The Information Technology Association of America says about 800,000 of the new IT jobs created in the U.S. this year will have no one to fill them. Meta Group Inc. says we'll be 600,000 short. And International Data Corp. says Europe will have 1.3 million more IT jobs than qualified workers this year.

The message is clear. We always knew importing programmers was a short-term solution to our IT labor shortage. We just didn't realize how short-term it was. Now it's everybody's IT gap. And we're all in trouble.

The obvious long-term solution — getting more kids to grow up to become IT people — won't happen fast enough. Waiting for industry groups and politicians and the schools to fix the problem won't do it.

We've got to start taking action ourselves.

For one thing, we've got to stop hemorrhaging employees. With typical IT shop turnover hovering around 20%, as much as one-third of our personnel costs go to recruiting replacements for the ones who quit. We aren't losing just experience and opportunities, we're burn-

ing money we could be spending on improving skills or creating better perks — or just paying our people more for what they do.

We've also got to get serious about training. Hiring people with specialized skills off the street is grotesquely expensive, and we'll lose them as soon as a better offer comes along.

We've got to reward employees who take the initiative and upgrade their own skills — and get solidly behind training everyone in the shop, even if it means we risk losing employees once they're better trained.

And we've got to cut the human resources department out of the hiring loop. We're dying for good people, and too many candidates can't make it past human resource departments' literal-minded ideas about qualifications.

We've also got to look harder, casting a wider net for the right people. We've got to get real about older IT workers, programmers who don't have computer science degrees (remember, Bill Gates doesn't either) and people who want to move into IT from other parts of the business. Some of those people won't fit — but some will fit fine, and we should be making room for them.

We've got to move, and move fast. Because from here on in, we

can't just grab IT people from Germany or India or anywhere else. They're all grabbing, too — and it may be all we can do to hold on to who we've got. ■

Hayes, Computerworld's staff columnist, has covered IT for more than 20 years. His e-mail address is [frank\\_hayes@computerworld.com](mailto:frank_hayes@computerworld.com).

*The IT labor shortage is now officially a worldwide problem.*



## SHARK TANK

### THE VALUE OF PRIORITIES

Pilot fish's team is given two weeks to test a pair of database tool sets. Tool A barely works. Tool B is clearly better. But before they can report their results, the boss tells them Tool A has been selected. Huh? Why? they ask. Well, Tool A is cheaper. More important, Vendor A is preapproved by the company, so by picking A's tool, the boss can save a lot of paperwork. Discussion closed.

### THE VALUE OF SECURITY

Forward-thinking enterprise puts in a new authentication system with a public-key infrastructure (PKI), digital certificates, the whole works. One day, the PKI system refuses the CEO's certificate. He goes ballistic. The system is, er, adjusted. Now the CEO's certificate is an electronic skeleton key: Whenever it's presented, the door swings open. "No checking the certificate revocation list, no verification, nada," says a pilot fish. "It goes on through to do its thing."

### THE VALUE OF VALUE

In March, Boss No. 1 reams this pilot fish for making long-distance calls home when he works late. Next month, Boss No. 2 lauds

fish's work bringing his project in on time: "You easily saved the company a half-million dollars," says the boss. October: Boss No. 3 lays him off — at \$35,000 per year, fish is "too expensive."

### THE VALUE OF RECRUITING

Pilot fish reports half his IT group has left for start-ups in the past three months. "Management is in a panic and wants us to hire warm bodies," he says. "Problem is, they don't want us talking to recruiters — they're worried we'll wind up getting better offers!"

### THE VALUE OF A NAME

One LAN manager just got a new directive: Register the domain names for every variation of his company and subsidiaries' names followed by [sucks.com](http://sucks.com). Seems some suit read that \*\*\*[sucks.com](http://sucks.com)\*\*\* was the most likely domain name to be used to post damaging information about a company," says the pilot fish. Right — that'll put a stop to all that grousing, for sure!

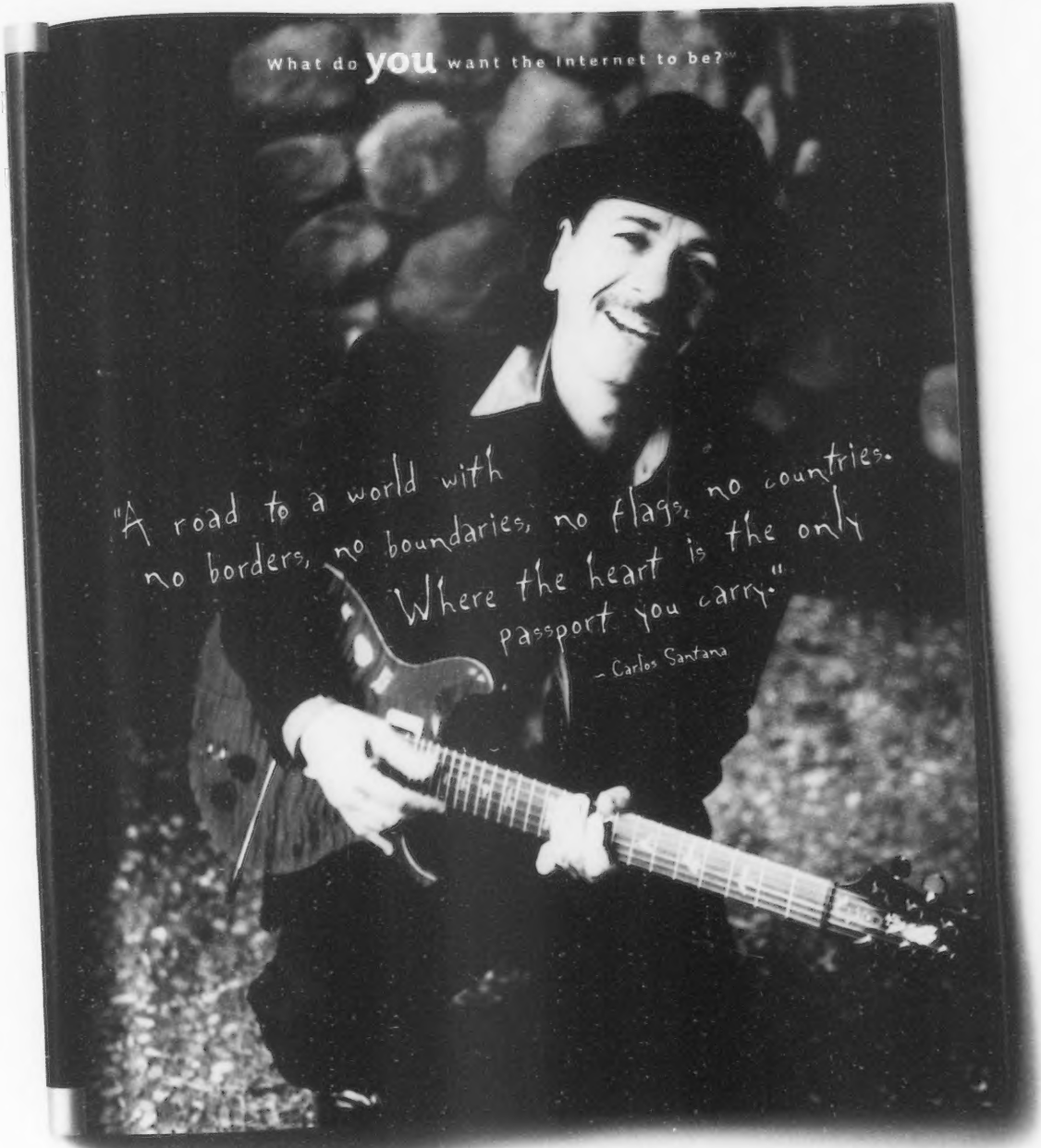
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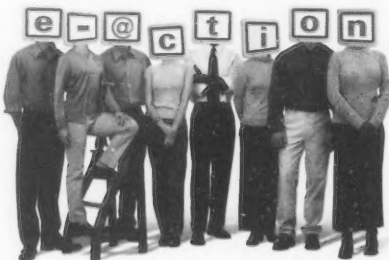
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